



Evaluation of the USAID-Funded Collaborative Agricultural Research Networks in West and Central Africa

December 31, 2004

Final Report



Evaluation of the **USAID-Funded** **Collaborative Agricultural Research Networks** in **West and Central Africa**

FINAL REPORT

Under the
Rural and Agricultural Incomes with a Sustainable Environment (RAISE)
IQC No. PCE-I-00-99-00001-00, Task Order 827

December 31, 2004



Submitted to:
The West African Regional Program (WARP)
USAID
Bamako, Mali

Submitted by:
ARD-RAISE Consortium
159 Bank Street, Suite 300
Burlington, VT 05401, USA
www.ard-raise.com



Note: The views expressed in the following report are those of the authors and do not necessarily reflect the opinions or policies of the U.S. government.

TABLE OF CONTENTS

PREFACE	ii
ACKNOWLEDGMENTS.....	iii
ACRONYMS.....	iv
EXECUTIVE SUMMARY	ES- I
1.0 INTRODUCTION AND EVALUATION BACKGROUND	I
2.0 EVALUATION METHODOLOGY	5
2.1 Timeline and Schedule	5
2.2 Methodology	6
3.0 COMPARATIVE ANALYSIS OF THE NETWORKS.....	8
3.1 The Importance of Network Crops in West African Agriculture and Food Security	8
3.2 Major Regional Constraints to Increased Production.....	12
3.3 Historical Background of The Networks.....	12
3.4 Purpose and Program Components	13
3.5 Organizational Structure	14
3.6 Budget.....	15
3.7 Progress since 1996 Evaluation	16
4.0 CROSS-CUTTING ISSUES AND INSTITUTIONAL LINKAGES	18
4.1 Technology Development, Exchange, and Dissemination.....	18
4.2 Institutional Considerations	20
4.3 Capacity Building.....	27
4.4 Network Administration and Management	28
4.5 Financial Sustainability	33
5.0 SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS.....	36
6.0 PROPOSED PLAN AND PATHWAY FOR IMPLEMENTING THE RECOMMENDATIONS.....	39
APPENDIX A: SUMMARY ANALYSIS OF THE RICE NETWORK: ROCARIZ	A-I
APPENDIX B: SUMMARY ANALYSIS OF THE MAIZE NETWORK: WECAMAN	B-I
APPENDIX C: SUMMARY ANALYSIS OF THE SORGHUM NETWORK: ROCARS	C-I
APPENDIX D: SUMMARY ANALYSIS OF THE MILLET NETWORK: ROCAFREMI	D-I
APPENDIX E: DAILY SCHEDULE	E-I
APPENDIX F: LIST OF KEY ORGANIZATIONS AND PERSONS CONTACTED	F-I
APPENDIX G: TASK ORDER (SCOPE OF WORK)	G-I
APPENDIX H: KEY DOCUMENTS CONSULTED	H-I
APPENDIX I: PROGRESS IN IMPLEMENTING RECOMMENDATIONS OF THE 1966 EVALUATION	I-I
APPENDIX J: INSTITUTIONAL ASSESSMENTS FOR NETWORK COORDINATION	J-I
APPENDIX K: MAJOR FINDINGS AND RECOMMENDATIONS	K-I

PREFACE

This document constitutes the Final Report on the “Evaluation of the USAID-funded Collaborative Research Networks in West and Central Africa” commissioned by USAID’s West Africa Regional Program (WARP) and conducted under Task Order 827 of the RAISE IQC (PCE-I-00-99-00001-00) by ARD, Inc. ARD’s three-person evaluation team (Team) was made up of Team Leader/Senior Agronomist Steve Clarke, Senior Institutional Analyst/Agricultural Economist Brent Simpson, and Senior Agronomist/Technical Transfer Specialist Amadou Beye.

This evaluation covered the following four regional, cereal-based research Networks:

- West and Central Africa Rice Research Network (ROCARIZ)
- West and Central Africa Collaborative Maize Research Network (WECAMAN)
- West and Central Africa Sorghum Research Network (ROCARS)
- West and Central Africa Millet Research Network (ROCAFREMI).

The Team visited nine West African countries (Mali, Burkina-Faso, Niger, Senegal, the Gambia, Cote d’Ivoire, Nigeria, Benin, and Ghana, in that order) during July and August 2004 to interview Network participants, partners, and beneficiaries and to collect documentation and data on the ground. The Team also visited a number of farmers, processors, input dealers, seed producers, extension offices, and key regional agricultural development institutions.

In September, the Team submitted a Discussion Draft to WARP that presented the initial findings, conclusions, and recommendations of the evaluation. WARP circulated this preliminary draft to its principal Network partners through the Network coordinators of ROCARIZ, WECAMAN, and ROCARS as well as the executive secretary of the *Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles* (West and Central African Council for Agricultural Research, or CORAF), and invited the Team to make a presentation to these partners on September 29-30 in Bamako. On the basis of discussions and the feedback received during these meetings, as well as written comments from the partners received by the Team through WARP during October, the Team finalized its report. ARD submitted the Final Report to WARP on November 15, 2004.

ACKNOWLEDGMENTS

The Team expresses its sincere thanks to the large number of people and organizations who worked hard to support and assist our mission and who helped us understand the important efforts underway in West and Central Africa (WCA) to improve agricultural productivity, increase incomes and reduce the persistent problems of poverty and hunger. Special gratitude is offered to the Network coordinators of the four Networks we were evaluating (Drs. Badu-Apraku, Ntare, Ouendeba, and Sanyang) for their briefings, communications with Network members throughout the WCA, and assembly of key documents; the country (national) coordinators, too numerous to name here, who answered our calls/e-mails (sometimes on short notice), arranged our country visits, and organized overviews of country programs and meetings with Network colleagues; and the National Agricultural Research System (NARS) scientists who patiently answered our many questions and shared their work, views, and concerns with honesty—they are the heart and soul of the Networks.

We also thank the IARC scientists at the International Institute for Tropical Agriculture (IITA), WARDA, and ICRISAT; NARS and IARC directors and other leadership; as well as officials at CORAF, Forum for Agricultural Research in Africa (FARA), *Institut du Sahel* (INSAH), *Réseau des Organisations Paysannes et de Producteurs de l'Afrique de l'Ouest* (ROPPA), Semi-Arid Food Grains Research and Development (SAFGRAD), and Sasakawa Global 2000. Sincere thanks are also due the WARP staff in Bamako, especially Rolf Anderson and Robert Kagbo, who explained WARPS' evolving agriculture strategy and the evaluation's purpose and context; Dr. Bahiru Duguma at USAID/Washington, whose historic perspectives on the Networks were invaluable; and the ARD staff, especially our Senior Technical Adviser, Ryan Roberge, and our Project Manager, Barbara Leslie, at ARD's headquarters in Burlington, Vermont.

With deep respect and admiration we also thank the farmers whom we had the pleasure to meet, walk their fields, and discuss agricultural development at the grassroots. And with them, the processors, extension officials, seeds producers, input suppliers, and other individuals we met along the farm to market chain. Finally, we very much appreciate the input and comments received from our colleagues, but of course take full responsibility for any errors, omissions, or misrepresentations in this report.

ACRONYMS

ADRAO	<i>Centre de Riziculture pour l'Afrique</i> (Eng. WARDA)
AFR/SD	Bureau for Africa, Office of Sustainable Development (USAID)
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
CAADP	Comprehensive African Agriculture Development Programme
CBSS	Community-based seed systems
CG center	An International Agricultural Research Center of the Consultative Group
CGIAR	Consultative Group for International Agricultural Research
CLAN	Cereals and Legumes Asia Network
CORAF	<i>Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles</i> (Eng: West and Central African Council for Agricultural Research)
CRSP	Collaborative Research Support Program (USAID)
CU	Coordination Units
FARA	Forum for Agricultural Research in Africa
FFS	Farmer Field Schools
IARC	International Agricultural Research Center (CGIAR system)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (Fr: <i>Institut International de Recherche sur les Cultures des Zones Tropicales Semi-arides</i>)
IEHA	Initiative to End Hunger in Africa (a U.S. presidential initiative)
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Center
IITA	International Institute for Tropical Agriculture (Fr: <i>Institut International pour l'Agriculture Agricole</i>)
INSAH	<i>Institut du Sahel</i> (Eng: Sahel Institute)
INTSORMIL	The International Sorghum and Millet CRSP
MIS	Market information system
MOA	Memorandum of agreement
NARES	National Agricultural Research and Extension System
NARS	National Agricultural Research System
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organization
PLAR	Participatory learning and action research
PPB	Participatory plant breeding
PRONAF	<i>Projet Niébé pour l'Afrique</i> (Eng: Cowpea Project for Africa)
PVS	Participatory varietal selection

R&D	Research and Development (in conjunction with IEHA S&T theme)
RAISE	Rural and Agricultural Incomes with a Sustainable Environment
ROCAFREMI	<i>Réseau Ouest et Centre Africain de Recherche sur le Mil</i> (Eng: West and Central Africa Millet Research Network)
ROCARS	<i>Réseau Ouest et Centre Africain de Recherche sur le Sorgho</i> (Eng: West and Central Africa Research and Development Network)
ROCARIZ	<i>Réseau Ouest et Centre Africain du Riz</i> (Eng: Regional Rice Research and Development Network for West and Central Africa)
ROPFA	<i>Réseau des Organisations Paysannes et de Producteurs de l'Afrique de l'Ouest</i> (Eng: West African Network of Producers and Farmer Organizations)
S&T	Science and technology
SACCAR	Southern Africa Centre for Co-operation in Agricultural Research and Training
SAFGRAD	Semi-Arid Food Grains Research and Development
SDC	Swiss Agency for Development and Cooperation
SRO	Sub-Regional Organization (referring to ASARECA, CORAF, and SACCAR)
SWOT	Strengths, Weaknesses, Opportunities, Threats
USAID	United States Agency for International Development
WARDA	The Africa Rice Center, formerly West African Rice Development Association (Fr: ADRAO)
WARP	West Africa Regional Program (USAID)
WCA	West and Central Africa
WCAMRN	West and Central Africa Millet Research Network (Fr: ROCAFREMI)
WCASRN	West and Central Africa Sorghum Research Network (Fr: ROCARS)
WECAMAN	West and Central Africa Collaborative Maize Research Network
WECARD	West and Central African Council for Agricultural Research (Fr: CORAF)

EXECUTIVE SUMMARY

This document constitutes the Final Report on the “Evaluation of the USAID-funded Collaborative Research Networks in West and Central Africa (WCA)” commissioned by USAID’s West Africa Regional Program (WARP) and conducted under Task Order 827 of the Rural and Agricultural Incomes with a Sustainable Environment (RAISE) IQC (PCE-I-00-99-00001-00) by ARD, Inc.

For more than 18 years, USAID has supported the International Agricultural Research Centers (IARCs) in implementing agricultural research networking projects in Africa in collaboration with the National Agricultural Research Systems (NARS). In September 2003, responsibility for funding and management of the Networks in WCA was transferred from USAID/Washington to USAID/WARP, currently based in Bamako, Mali.

WARP covers 18 countries in the West African subregion, and it has been given the mandate to implement the Presidential Initiative to End Hunger in Africa (IEHA). WARP’s IEHA action plan is built on the principle that IEHA investments must “rapidly and sustainably increase agricultural growth and rural incomes in West Africa” and must emerge from a rigorous analysis of West African investment opportunities. The priority thematic areas for the 2003–2008 initial phase of IEHA are enhanced science and technology (S&T) and agricultural markets and trade.

The evaluation covered the following four regional, cereal-based research Networks:

- West and Central Africa Rice Research Network (ROCARIZ)
- West and Central Africa Collaborative Maize Research Network (WECAMAN)
- West and Central Africa Sorghum Research Network (ROCARS)
- West and Central Africa Millet Research Network (ROCAFREMI).

The evaluation has two primary objectives:

1. Assess the current purpose and effectiveness of the Networks. Provide guidance on the future orientation and operation of the Networks and for CORAF/WECARD and the scientific partners on steps that might lead to more effective future networking.
2. Provide input into donor decisions regarding future Network support. It will therefore be used by WARP to determine whether (and how) to continue support to the Networks, and how the Networks fit into WARP’s IEHA S&T program.

WARP indicated that the level of resources available for supporting the Networks is insufficient to continue the same structure and funding levels as in the past. Given reduced levels of donor funding, the region must reflect on what the Networks can do best, what they can afford to do, and how to reduce the dependence on donor funding in order ensure sustainability. In addition, questions have been raised about the current effectiveness of the Networks and some of their activities as well as concerns about the continued appropriateness of the Networks historical role and purpose.

The Team visited nine West African countries (Mali, Burkina-Faso, Niger, Senegal, the Gambia, Cote d’Ivoire, Nigeria, Benin, and Ghana, in that order) during July and August 2004

to interview NARS and IARC scientists and directors active in these Networks and other Network partners and beneficiaries, and to collect primary and secondary information. The Team also visited a number of farmers, processors, input dealers, seed producers, extension offices, and key regional agricultural development institutions.

The **major findings and conclusions** of this evaluation are as follows:

1. The history of the agricultural research Networks in WCA shows a strong record of major, sustained investment and support by USAID that is widely recognized and appreciated within the region.
2. The Networks have amply demonstrated their importance and value to regional, collaborative agricultural research in WCA, making them well positioned to contribute significantly to IEHA.
3. It is difficult to fully and accurately assess Network impact, due to insufficient data, and this poses a problem for the Networks as they seek to make the case for increased financial support.
4. The full and active involvement in the research process by farmers (the primary client and targeted end-user) has shown its great value in helping ensure that research specifically addresses and focuses on farmers' needs and constraints (demand-driven, not supply-driven research), thereby resulting in higher rates of adoption of new varieties and other technologies truly suited to the specific circumstances of farmers.
5. There continues to be a widespread lack of good Internet connectivity throughout much of WCA, a situation which impedes the ability of Network scientists to communicate with each other and the rest of the agricultural research and development (R&D) community.
6. African universities, especially faculties of agriculture, seem largely uninvolved in Network programs, which is a lost opportunity for both and a detriment to WCA farmers.
7. Despite the valued services and functions provided by the Networks, national governments in the region have not yet summoned the political will nor found the necessary means internally to begin funding Network research on their own.
8. R&D progress made by the Networks to date, together with the changing conditions in the region as well as the evolving needs of farmers and others in the cereal subsector, require new strategic directions, programs, and partners.
9. New areas of emphasis of the Networks would benefit greatly from additional specialized expertise to ensure rapid initial progress and near-term results, specifically in seed systems, post-harvest processing, and learning modules for improved production environments.
10. As the Networks assess and embark on new strategic directions, this provides an excellent opportunity for thinking creatively about program emphases, new partnerships, and potential cross-network activities.
11. Many serious and thoughtful ideas have been expressed by USAID and the key Network partners about the best way to move forward in reconfiguring or combining (or not) the existing Networks, and in considering where to locate the Network coordination units (CUs).

On the basis of these findings, the Team makes the following recommendations.

SUMMARY OF MAJOR RECOMMENDATIONS

1. WARP and its key partners should carefully review the remarkable history and achievements of agricultural research Networks in WCA, with a view to making their decisions regarding the future of the Networks within the larger historical context and longer term development goals and vision of the region.
2. The current investors (NARS, IARCs, USAID, CORAF) should continue, if not increase, their support for these Networks by making a reasonably long-term funding commitment, subject to the Networks' continued evolution in response to changing needs of farmers and the cereal sector, increased impact, and periodic review and assessment.
3. The Networks should work together and in conjunction with the NARS to develop systems to collect and analyze the necessary data to better quantify the socioeconomic impact of Network activities at the farm level.
4. The Networks should much more strongly encourage and promote the application and use of farmer-participatory methods in all future Network research programs, with the expectation of spillover of these approaches into national research programs.
5. USAID, CORAF, FARA, and other interested partners should undertake, with a sense of urgency, a study on the technical and economic feasibility of establishing and maintaining satellite linkages to allow vastly improved Internet connectivity for key research stations and groups throughout the region.
6. The Networks should make specific plans to establish linkages with training and research programs in the African university community.
7. The NARS, individually and collectively through CORAF, should find new creative and persuasive ways, through the influence of their combined strength and within the auspices of the New Partnership for Africa's Development (NEPAD), to appeal to national governments to change their policies related to funding of national research and, as a start, to cover the costs of some of the Networks' research programs.
8. The Networks should all carefully review both the balance of funding research and technology transfer in their programming as well as the creation of synergies between activities to maximize opportunities for vigorously moving promising technologies into the hands and fields of farmers.
9. USAID, in conjunction with other donors, should consider funding, for a limited period of three to five years, three internationally recruited scientist positions to provide regionally oriented, Network-connected support in the areas of seed systems, post-harvest processing, and improved production environments.
10. In their next phase of development, the Networks should begin to consider a larger vision and build areas of programmatic cross-network activity.
11. The leadership of the Networks, working in conjunction with CORAF and WARP, should design and facilitate a process, based on consensus and compromise, for arriving at a set of changes to the Networks' configuration and coordination base.

On the basis of these findings and recommendations, it is clear that the Networks find themselves at a crossroads where a number of important decisions need to be made to secure their futures, especially in terms of strategic direction and organizational structure. Maintaining and supporting Network self-determination is essential, as it defines in many ways the high level of “ownership” that nearly all participants report. Strong local ownership will be key for the Networks as they negotiate the challenges before them, seek to maintain high levels of relevancy to national research agendas, and build the prospects for future sustainability of Network functioning.

To encourage and support a Network-run and -owned planning process, the Team strongly recommends that WARP and CORAF organize a joint Networks workshop and planning meeting to discuss the Networks, review options, and reach a consensus on the future direction and coordination structure of the Networks. As part of this process, the Team suggests that:

- CORAF and the appropriate Network coordinators be strongly encouraged to facilitate the completion of the merger of ROCARS and ROCAFREMI into a single Network.
- CORAF and the appropriate Network coordinators be strongly encouraged to facilitate the immediate merger of the CORAF Maize Network with WECAMAN.
- The Networks consider ways of building cross-network linkages (e.g., processing, seed systems), both among existing cereal Networks as well as with other Networks (e.g., legumes) and initiatives (e.g., CRSPs like the International Sorghum and Millet CRSP).

Guided by criteria of necessary service provision and backstopping, the Networks and their partners decide on and/or reaffirm the best location for the coordination of each Network. The Team’s analysis suggests that the coordination of ROCARIZ and WECAMAN would probably be best maintained for the time being at their current locations (WARDA and IITA, respectively); whereas the joint ROCARS-ROCAFREMI Network might now be best based at an appropriate NARS, or through a joint NARS-IARC coordination model such as currently employed by ROCARS with the Mali NARS.

1.0 INTRODUCTION AND EVALUATION BACKGROUND

For more than 18 years, USAID has supported the International Agricultural Research Centers (IARCs) in implementing agricultural research networking projects in Africa in collaboration with the National Agricultural Research Systems (NARS). In West Africa, the specific Networks under consideration in this evaluation that benefited from the USAID support include the WARDA rice research network (ROCARIZ), the International Institute for Tropical Agriculture (IITA) maize R&D network (WECAMAN), the ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) sorghum research network (ROCARS), as well as many others.

Since termination of support to the Semi-Arid Food Grains Research and Development (SAFGRAD), these Networks have been supported under the USAID Africa Bureau's (AFR/SD) Strategic Objectives. The latest of the AFR/SD's five-year (1998–2003) objectives were the "Adoption of Improved Agricultural Policies, Programs, and Strategies" and "Improved policies, programs, and strategies for sustainable technology development and transfer." The focus of the strategy was on (1) sustainable increased food security and addressing critical science and technology issues, marketing efficiency, and increased participation of the private sector and (2) creating stronger linkages between these programs, policies, and strategies, on the one hand, and positive nutrition outcomes, on the other.

In September 2003, responsibility for funding and management of the Networks was transferred to USAID's West African Regional Program (WARP), currently based in Bamako, Mali. WARP covers 18 countries in the West African subregion, and it has been given the mandate to implement the Presidential Initiative to End Hunger in Africa (IEHA), discussed in more detail below. In taking on this mandate, WARP decided that it was necessary to review the Networks and found their proposal strongly embraced by many of the key partners and players involved in the Networks. Note that the last evaluation of the West African Networks was conducted in 1996 (Mullenax et al., 1996).

WARP has also indicated that the level of resources available for supporting the Networks is insufficient to continue the same structure and funding levels as in the past. Given reduced levels of donor funding, the region must reflect, according to WARP, on what the Networks can do best, what they can afford to do, and how to reduce the dependence on donor funding in order ensure sustainability. In addition, questions have been raised about the current effectiveness of the Networks and some of their activities, as well as concerns about the continued appropriateness of the Networks historical role and purpose.

Historically, the purpose of these Networks has been to increase the regional effectiveness and efficiency of agricultural research on key food crops through organizing critical masses of expertise, breaking down professional isolation, contributing to professional growth and development, and establishing constructive relationships between NARS and IARC research programs. Toward the end of the SAFGRAD II project, a strategy was elaborated for transferring greater responsibilities for network coordination and leadership to the NARS (SAFGRAD/SCO, 1991). The envisioned two- to three-year transition phase and support activities were to be funded under a proposed "SAFGRAD III" project, but in fact this was never funded.

Although the SAFGRAD initiative itself lost funding, a series of assessments conducted in the early 1990s on the returns to agricultural research projects swayed USAID thinking and led to the continued funding of the Networks through alternative channels (e.g., Oehmke and Crawford, 1993). Lacking the cohesive framework and legitimizing oversight body provided through the OAU/SAFGRAD program, the Networks have continued to evolve over the past decade as ostensibly autonomous structures relying on the IARCs for the majority of their coordination and leadership. This deep involvement of the IARCS in coordinating the Networks is viewed by some as both an advantage, through the association with competent research centers and experienced coordinators (as well as IARC's ability to receive and manage donor funding), and in some respects also a disadvantage, due to perceived high management costs of the centers. Following the emergence of a restructured West and Central African Council for Agricultural Research (CORAF/WE CARD) as a representative, bilingual organization for the coordination of agricultural research in the subregion, questions of Network coordination, leadership, and purpose have again been raised.

At this juncture, WARP believes that helping the Network owners establish a common future vision of the Networks—and helping to lay down a clear path for implementation—should be a particular focus of this evaluation. This was considered particularly important given the autonomous nature of the Networks and the uncertainty of future funding streams from donors, including USAID. WARP states that, ideally, the Networks should be coordinated by local structures as a means of helping to ensure their sustainability. The evaluation team was therefore requested to deeply engage all the implementing partners (NARS, IARCs, CORAF, other scientific partners—as well as other interested parties) in this review.

Another important dimension of the context in which WARP now finds itself operating is the role it is called on to play in implementing the IEHA. IEHA was launched at a workshop during the World Summit on Sustainable Development in August 2002 in South Africa and is implemented by USAID and its partners. The objective of IEHA is to rapidly and sustainably increase agricultural growth and raise incomes in Sub-Saharan Africa so as to significantly reduce hunger and poverty in the region, thereby ensuring food security for future generations. Agriculture is a major component of this initiative, designed as a 15-year program (2003–2017) in selected countries in Sub-Saharan Africa.

The investments proposed for IEHA focus on deepening and broadening the impact of activities on rural incomes by addressing key constraints along the agricultural supply chain. In summary, these investments support six thematic areas as follows:

1. Advancing science and technology (S&T)
2. Development of efficient agricultural trade and market systems
3. Strengthening of community-based producer organizations
4. Human and institutional capacity building
5. Sustainable environmental management
6. Ensuring that vulnerable groups and countries in transition are not left out.

As part of IEHA, selected participating USAID missions in *Focus Countries* (showing promising conditions and opportunities for achieving agricultural growth) are to develop action plans that respond to IEHA's goal and its corresponding reporting requirements. In the case of West Africa, the Agency's current implementing units for the IEHA are the WARP and the USAID missions in Mali, Ghana, and Nigeria. The action plans of the USAID missions in these countries (only Ghana and Mali have submitted action plans thus far) are complementary documents to their country strategic frameworks. These missions in turn will receive funding from IEHA for their agricultural programs.

In fulfilling its mandate, WARP intends to reinforce the activities of these focus-country missions and to collaborate with regional and international institutions working across the region so as to build on and strengthen subregional programs. For example, in the case of S&T, regional collaboration will lead to the sharing and dissemination of improved technologies and best practices, thereby benefiting a much wider audience in West Africa. As a result, WARP is interested in determining what role the Networks should play, if any, within WARP's IEHA program.

Agriculture continues to be of vital importance for West and Central Africa (WCA) countries. According to the Comprehensive Africa Agriculture Development Programme prepared by the Food and Agriculture Organization in cooperation with NEPAD, the agricultural sector accounts for about 60% of the total labor force, 20% of total merchandise exports, and 17% of GDP. Agriculture is the largest source of foreign exchange, accounting for 40% of the continent's currency earnings, and the main generator of savings and tax revenues. The agricultural sector is also still the dominant provider of industrial raw materials.

The new vision for agriculture among Africa's current leadership is that by 2015, WCA should:

- Attain food security.
- Increase the productivity of agriculture to attain an average of 6% per year, with particular attention to small-scale farmers.
- Have dynamic agricultural markets.
- Have integrated farmers into the market economy with the aim for Africa to become a net exporter of agricultural products.
- Practice environmentally sound production methods and have a culture of sustainable management of the natural resource base to avoid their degradation.

That vision is well reflected in WARP's IEHA Action Plan, which is built on the principle that IEHA investments must "rapidly and sustainably increase agricultural growth and rural incomes in West Africa" and must emerge from a rigorous analysis of West African investment opportunities. The priority thematic areas for the 2003–2008 initial phase of IEHA are enhanced science and technology (S&T) and agricultural markets and trade.

This evaluation covers the following four regional cereal-based research Networks. (A summary analysis of each of these Networks appears as Appendices A–D, respectively).

- West and Central Africa Rice Research Network (ROCARIZ)
- West and Central Africa Collaborative Maize Research Network (WECAMAN)
- West and Central Africa Sorghum Research Network (ROCARS)
- West and Central Africa Millet Research Network (ROCAFREMI).

As stated in the present task order, the evaluation has two primary objectives:

1. Assess the current purpose and effectiveness of the Networks. Provide guidance concerning the future orientation and operation of the Networks and for CORAF/WECARD and the scientific partners on steps that might lead to more effective future networking.
2. Provide input into donor decisions regarding future Network support. It will therefore be used by WARP to determine whether (and how) to continue support to the Networks, and how the Networks fit into WARP's IEHA S&T program.

Specifically, according to the statement of work in the task order issued by WARP, the evaluators shall:

1. Assess the role, objectives, and functions of the existing Networks in the region.
2. Review and evaluate the effectiveness and activities of the current Networks.
3. Review the existing institutional frameworks (how the Networks are structured and operate); institutional linkages and collaborative arrangements (who does what in terms of leadership, coordination, research, execution, implementation, dissemination, or support functions); and research and dissemination processes (what Networks do in the R&D domain in the region).
4. Assess whether all the existing Networks should be maintained and whether the network(s) could or should be expanded (or changed) to new crops/cereals, themes, issues, and problems.
5. Specifically address whether Network coordination should be consolidated, and provide guidance on the types, orientation, and operation of future Networks (or Network workgroups) within a consolidated network coordination structure.
6. Assess whether WARP should continue to fund the Networks under the IEHA program.
7. Provide guidance on options and alternatives for new sources of Network funding.

2.0 EVALUATION METHODOLOGY

The work plan for the evaluation was designed by the Team based on the stated objectives, list of issues and guidance provided in the task order, resources available, timelines, and the Team's own experiences in implementing agricultural R&D projects and conducting evaluations in West Africa over the years. The preliminary content of the work plan was presented to and discussed with WARP officials (Rolf Anderson, Robert Kagbo, and Harry Bottenberg) and a CORAF representative (Marcel Nwalozie) on July 6 in Bamako. The work plan was then revised based on suggestions from WARP and on some initial field testing in Mali. As agreed, the final version of the work plan was submitted to WARP on July 12.

2.1 TIMELINE AND SCHEDULE

The overall dates for the evaluation were June 30–September 30, later changed to November 15, 2004. The field work portion of the evaluation was divided into two phases with a brief break during the first half of August. During the field portion of Phase 1 (July 4–31), the Team visited Mali, Burkina Faso, Niger, Senegal, and the Gambia. During the field portion of Phase 2 (August 16–31), the Team visited Nigeria, Benin, and Ghana. Between Phases 1 and 2, Dr. Beye visited key contacts in Côte d'Ivoire. A detailed evaluation schedule and the list of key organizations and individuals consulted are provided as Appendices E and F, respectively.

Phase 1 began with an orientation and work planning session held for Mr. Clarke and Dr. Simpson on July 1–2 at ARD headquarters in Vermont and organized by Ryan Roberge, ARD's Senior Technical Adviser, and Barbara Leslie, ARD's Project Manager, for this activity. Beye participated from Abidjan via teleconference and e-mail communications. Clarke and Simpson traveled from Vermont to Bamako over the July 3–4 weekend, where they were met by Beye, who arrived from his home base in Abidjan.

On July 5, the Team spent extensive time at the Research Center in Samanko (35 km southwest of Bamako) meeting with key IARC scientists involved in Network or regional research activities for rice (WARDA) and sorghum and millet (ICRISAT). This included an initial briefing from the ROCARS Interim Coordinator, Dr. Bonny Ntare (ICRISAT Groundnut Breeder currently based in Mali). On July 7, the Team began its visits to the first five countries of Phase 1, starting in Mali. After the initial meetings in Bamako and country visits to Mali and Burkina Faso, Clarke returned to the United States while Simpson and Beye proceeded to visit Niger, Senegal, and the Gambia from July 17–31. Among the many meetings held, it should be noted that the Team met in Niger with the former Network coordinator of ROCAFREMI, Dr. Ouendeba Botorou; in the Gambia with the Network coordinator of ROCARIZ, Dr. Sidi Sanyang; and in Dakar with the leadership of CORAF/WECARD. The Team returned to their respective home bases on July 31.

During the first two weeks of August (beginning of Phase 2), team members prepared draft summaries and reviewed materials from the initial country visits and Network meetings. This provided an opportunity to reflect on what was learned during the first phase, formulate preliminary conclusions and recommendations, refine the approach and methodology as appropriate, and incorporate any issues that had emerged into the interview and information collection

process of the second phase. In addition, Clarke stopped in Washington, D.C. on his way back to Africa in mid-August and met with Dr. Bahiru Duguma, a senior agriculture adviser for USAID in the Africa Bureau with long-time knowledge of the Networks, together with several of his USAID colleagues who work with the CGIAR (Consultative Group for International Agricultural Research) system.

During the field work of Phase 2 beginning August 16, Clarke and Beye visited three additional countries (Nigeria, Benin, Ghana). Togo was on the original schedule of countries to visit, but unfortunately, the Team was forced to make some changes due especially to the time required to visit and move around within Nigeria and Ghana.

While in Nigeria, the Team spent a day and a half at the IITA/Ibadan with Dr. Badu-Apraku, the WECAMAN coordinator) and received a detailed briefing on WECAMAN's history, accomplishments, and future vision. It was also an opportunity to meet IITA scientists who participate in the Network, interview the IITA director general Dr. P. Hartmann and the new Deputy Director of Research for Development Dr. Stanford Blade, and visit some of the WECAMAN maize nurseries and seed increase plots. And while in Ghana, the Team spoke extensively with FARA's Executive Secretary, Dr. Monty Jones.

2.2 METHODOLOGY

Overall, the nature of the evaluation lent itself to the primary use of individual and group interviews, supplemented with document review. In specific cases, the Team asked key individuals to generate unique summaries of information in their possession, which was not available in any other format (e.g., a summation of the matching funds mobilized by NARS in carrying out Network-financed research within ROCARIZ).

The Team contacted the Network coordinators first and asked for their assistance in contacting each of the country (national) coordinators for each Network in each country the Team was to visit. In turn, the national coordinators were asked to organize meetings between the Evaluation Team and the NARS scientists most active in the different Networks. To the extent possible, the Team attempted to strike a balance in the contacts made with members of the different Networks. As time permitted, the Team also visited a number of farmers, processors, input dealers, seed producers, extension offices, and development non-governmental organizations (NGOs). In addition, as requested by WARP, the Team contacted the appropriate USAID and/or U.S. Embassy staff in a number of the countries visited.

During each of the site visits, the Team attempted to interview unique sources of information. For example, DGs of NARS were not interviewed along side the NARS Network coordinators, nor the NARS Network coordinators along side NARS scientists. In addition to the obvious potential of unwanted interview bias, the Team believed that a differentiated approach would enable it to pursue specific lines of questions most suited to the responsibilities, experiences, and opinions of each type of interview contact. The questions posed during the interview sessions were drawn from the task order for the evaluation, including Annex A, and the Team's own assessment of needed areas of inquiry. In all cases, the Team encouraged individuals interviewed to contribute any additional thoughts or information that occurred to them once they

had had time for further reflection. In addition, all individuals interviewed were given the contact information for each Team member for follow-up communication.

The Team developed its methodology for the evaluation following the process below:

- **Information needs:** These were defined by questions of the task order (see Appendix G) and the Team's own assessment of critical issues (the work plan contained illustrative areas of inquiry).
- **Sources of information:**
 - ♦ NARS DGs
 - ♦ NARS country (national) Network coordinators
 - ♦ NARS scientists participating in each Network
 - ♦ IARC DGs and senior research management
 - ♦ Network coordinators based at IARCs (ICRISAT, IITA, WARDA)
 - ♦ IARC scientists (ICRISAT, IITA, WARDA)
 - ♦ CORAF (Dakar), INSAH (Bamako), SAFGRAD (Ouagadougou)
 - ♦ NGOs (e.g., Winrock/Mali, ADEF/Mali, IFDC/Nigeria, SG 2000/Ghana)
 - ♦ Farmer organizations (e.g., ROPPA/Ouagadougou, INADES-Formation/Abidjan)
 - ♦ Private companies (e.g., Premier Seed/Nigeria)
 - ♦ Processors and input dealers
 - ♦ USAID/WARP (Bamako)
 - ♦ USAID/missions
 - ♦ USAID/Washington.
- **Specific interview questions and information requests:** The Team prepared interview guides for eight categories of interviewees to help ensure uniformity and consistency of the interview process across Networks and countries (see Annex B of the work plan).

The overall timeline for the evaluation can be found in chart form in Annex C of the work plan. The Team also prepared, on a country-by-country basis, a list of the key contacts and meetings it was targeting for the five countries to be visited during Phase 1. This was included in the work plan and a similar list was developed and sent to WARP in early August for the remaining three countries to be visited during Phase 2.

Through the six-weeks of field work the Team interviewed some 250 Network stakeholders in nine countries (Mali, Burkina Faso, Niger, Senegal, Gambia, Nigeria, Benin, Ghana, and Côte d'Ivoire), traveling more than 8,000 km by road in the process. Interviews were held with over 175 NARS scientists from 18 research stations; 22 IARC scientists at 6 stations (WARDA/Bamako, WARDA/St Louis, WARDA/IITA, ICRISAT/Bamako, ICRISAT/Niamey, IITA/Ibadan); and nearly 60 others, including farmers, processors, NGOs, and various development program directors and staff. A list of key documents consulted appears as Appendix H.

3.0 COMPARATIVE ANALYSIS OF THE NETWORKS

This section summarizes and analyzes, in comparative fashion, the four Networks. This is done by examining the importance and value of the crops to the region; the major regional constraints faced by these crops; and the Networks' historical background, purpose, programs, organizational structure, budget, and progress since the 1996 evaluation (see Appendix I). More in-depth analyses of each of the Networks are found in Appendices A–D. Additional comments are also made in section 4.0

3.1 THE IMPORTANCE OF NETWORK CROPS IN WEST AFRICAN AGRICULTURE AND FOOD SECURITY

The four cereal crops supported by the Networks targeted in this evaluation are without doubt the most important cereal crops in the subregion. As Figure 3.1 shows, following cassava and yams, these four cereals—sorghum, millet, maize, and rice (in that order)—account for the highest production in WCA. The same figure also illustrates that the same four cereals, plus cowpeas, account for the greatest harvested surface area in the subregion. These cereals also top the list in terms of per-capita consumption, along with cassava and yams, shown in Figure 3.2, and they are the top four food crops in terms of contributions to daily protein intake.

Figure 3.1. Harvest Area and Production of Main West Africa Crops, 2003
(cassava and yams are show as dry weight equivalent)

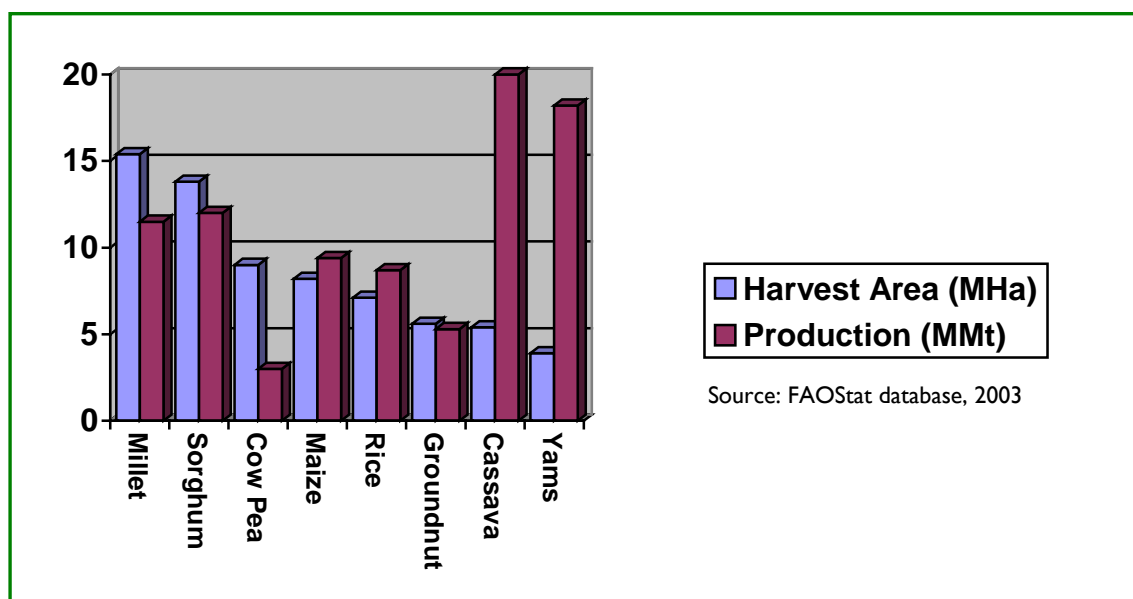
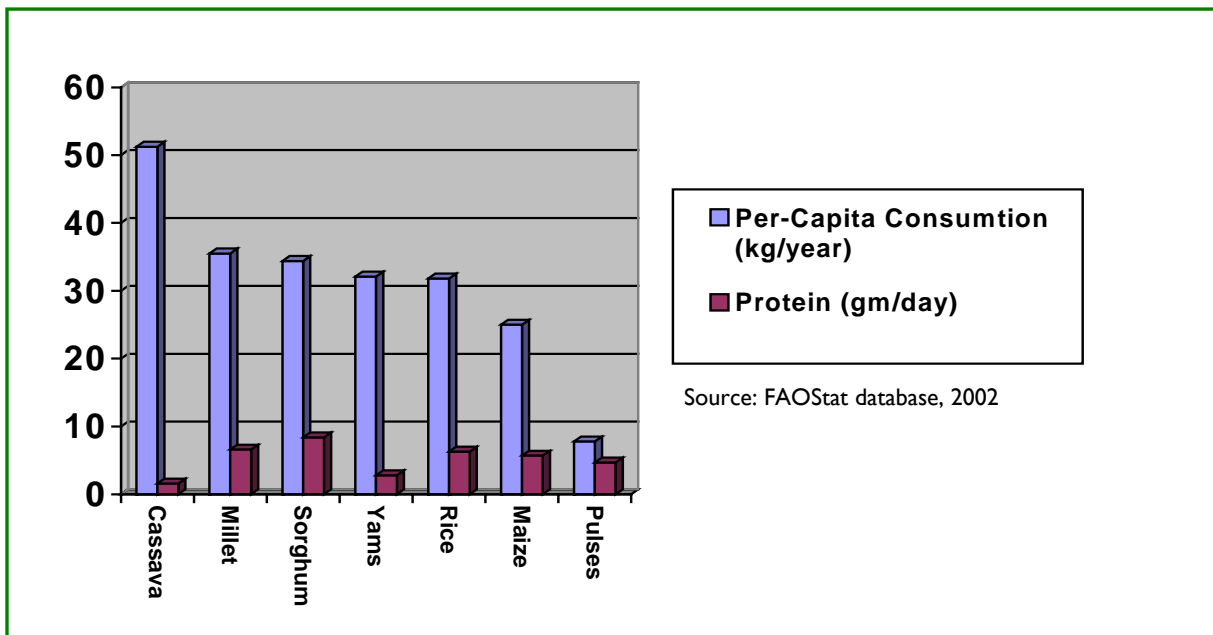


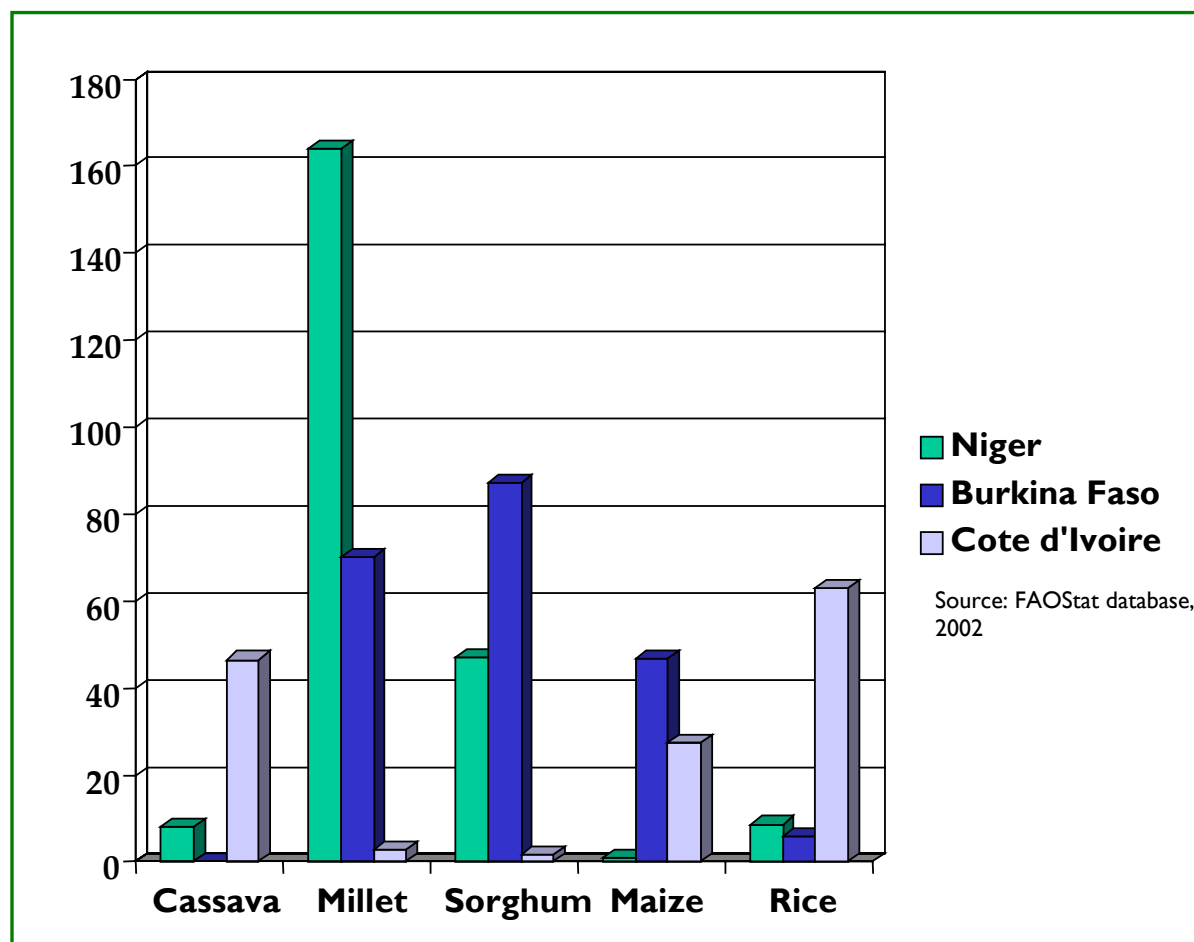
Figure 3.2. Per-Capita Consumption and Protein Contribution of Main West African Crops, 2002 (cassava and yams are shown as dry weight equivalent)



When considering the importance of different crops within the subregion, it is also important to look beyond the aggregate figures. Cassava, for example, is the most important crop in the subregion in terms of both production and consumption. Yet, when the data are disaggregated by country, it emerges that nearly 70% of the total is produced and consumed by Nigeria alone (although Nigeria contains only half of the subregion's population). Over 85% of cassava production and consumption is accounted for when Nigeria and Ghana are combined. The same is true for yams, whereas the influence of Nigeria is more in proportion to its population for the other crops.

Cutting across the agro-ecological zones from the drier north to the moister south, Figure 3.3 further illustrates differing profiles of per-capita crop consumption (a scale neutral measure) for three countries: Niger, Burkina Faso, and Côte d'Ivoire. As one would expect, there are significant differences between the relative importance of crops in the Sahel, the Guinean savanna, and more humid coastal areas. Although not obvious from the figure, it is important to keep in mind that, although millet is the principal dietary component in the Sahel, little else can be grown in this area. A situation much different from the more humid zones to the south, where cultural preferences, rather than absolute ecological drivers, are a major factor in shaping local dietary patterns.

**Figure 3.3 Comparison of Per-Capita Consumption (kg/year) of Principal Food Crops, 2002
(cassava shown as dry weight equivalent)**



The relative importance of the eight major food crops is shown in Table 3.1, in terms of harvested areas and as a percentage of the total arable land for the subregion for each country.¹ Whether applying a screening rule, such as selecting the top three to four food crops per country, or selecting those crops that occupy 10% or more of total surface area, the data in this table clearly indicate that the four cereal crop Networks—ROCAFREMI, ROCARIZ, ROCARS, and WECAMAN—are targeting the most important crops for food security in WCA. On the basis of these data, cassava is also clearly among the top five food crops, although, by virtue of its physiology, it shares little in common with the cereal crops, and thus provides little scope for joint activities or cross-network spillover.

¹ The data in this table were pulled directly from the FAOSTAT database; no attempt was made to clarify or verify any of the information. For consistency, the base year of 2002 was used.

Table 3.1 Harvest Area and Percent of Arable Land per Crop, 2002 (Source: FAOStat 2002)

	Total Arable (ha)	Cassava	Cow Pea	Groundnut (in shell)	Maize	Millet	Rice (paddy)	Sorghum	Yams
West Africa	61,395,000	5,347,244 (8.7)	9,020,481 (14.7)	5,504,643 (9.0)	8,166,044 (13.3)	15,725,935 (25.6)	5,261,059 (8.6)	13,319,979 (22.7)	3,910,041 (6.4)
Benin	2,550,000	264,610 (10.4)		163,744 (6.4)	704,672 (27.6)	48,732 (1.9)	29,759 (1.1)	193,520 (7.6)	174,994 (6.8)
Burkina Faso	4,348,000	1,000 (0.0)	50,191 (1.1)	342,637 (7.9)	375,755 (8.6)	1,389,618 (31.9)	46,871 (1.1)	1,484,369 (34.1)	3,021 (0.1)
Cape Verde	42,000	260 (0.6)			34,122 (81.0)				
Cote D'Ivoire	3,100,000	320,000 (10.3)		150,000 (4.8)	600,000 (19.4)	95,000 (3.1)	510,000 (16.5)	58,000 (1.9)	350,000 (11.3)
Gambia	250,000	2,500 (1.0)		90,000 (36.0)	16,000 (6.4)	92,000 (36.8)	10,000 (4.0)	16,000 (6.4)	
Ghana	4,181,000	794,440 (19.0)		384,000 (9.2)	939,600 (22.5)	198,010 (4.7)	122,810 (2.9)	337,150 (8.1)	300,010 (7.2)
Guinea	900,000	224,509 (24.9)		204,082 (22.7)	90,751 (10.0)	12,000 (1.3)	522,214 (58.0)	7,000 (0.8)	3,700 (0.4)
G. Bissau	300,000	2,200 (0.7)		16,000 (0.5)	14,800 (0.5)	37,200 (12.3)	68,000 (22.7)	15,400 (5.1)	
Liberia	380,000	72,500 (19.0)		8,000 (2.1)			120,000 (31.6)		2,300 (0.6)
Mali	4,660,000	2,086 (0.0)	316,845 (6.8)	204,922 (4.4)	317,309 (6.8)	1,557,590 (33.4)	360,415 (7.7)	923,272 (19.8)	3,616 (0.0)
Mauritania	488,000		20,849 (4.2)	2,500 (0.5)	8,466 (1.7)	5,175 (1.1)	16,975 (3.5)	80,135 (16.4)	400 (0.1)
Niger	4,487,000	5,000 (0.1)	3,500,000 (78)	230,000 (5.1)	9,000 (0.2)	5,200,000 (115.9)	27,800 (0.6)	2,700,000 (60.2)	
Nigeria	30,200,000	3,455,000 (11.4)	5,000,000 (16.6)	2,782,000 (9.2)	4,490,000 (14.9)	6,162,000 (20.4)	3,116,000 (10.3)	7,068,000 (23.4)	3,017,000 (10.0)
Senegal	2,460,000	22,139 (0.9)	132,596 (5.4)	841,758 (34.2)	106,772 (4.3)	819,498 (33.3)	75,215 (3.0)	199,835 (8.1)	
Sierra Leone	535,000	61,000 (11.4)		21,000 (3.9)	15,297 (2.8)	11,612 (2.2)	200,000 (37.4)	17,298 (3.2)	
Togo	2,510,000	120,000 (4.8)		64,000 (2.5)	443,500 (17.7)	97,500 (3.9)	35,000 (1.4)	220,000 (8.8)	55,000 (2.2)

3.2 MAJOR REGIONAL CONSTRAINTS TO INCREASED PRODUCTION

Each of the four Networks has conducted a systematic strategic planning process to identify the major constraints of a regional (not local) nature that hinder increased yields and production. These constraints became the objects of targeted and intensive collaborative research, germplasm exchange, and regional trials sponsored by the Networks. All four crops face a number of important biotic constraints, which are mostly crop specific and include yield-reducing plant diseases, insect pests, and even special weed problems. The parasitic weed *Striga* is a widespread problem in all but rice throughout the region and, though certain control methods such as varietal resistance are specific to each cereal, some approaches (e.g., trap crops, increased fertility) cut across crops and thus Networks.

Moisture issues, whether in terms of drought for the three rain-fed cereals or water management for rice, are major abiotic constraints common to the region. Inherently low soil fertility (especially N and P) is another significant abiotic constraint faced by all WCA cereal farmers. As a result, all Networks have worked on improving technologies for helping producers raise fertility levels through use of organic matter, fertilizers, and intercropping and/or associations with N-fixing legumes. Farmers also face a variety of policy and institutional constraints as well, such as undeveloped markets, high cost or unavailability of inputs, labor needs (especially for weeding), difficult access to credit, and often weak research-extension-farmers linkages—all of which inhibit increases in grain yields and production.

Historically, much of the research emphasis to solve the biotic, and even to some extent the abiotic, constraints was placed on plant breeding research. The breeding, selection, and exchange of traditional germplasm and improved varieties that carry genetic resistance to the main pests (insects, diseases, and *Striga*) and even to drought occupied much of the earlier Network research agenda and provided some promising results, though not all have made it into farmer's fields. Increasing emphasis in recent years has been placed on technology transfer and dissemination. And the Networks have begun to put resources into farm-level testing, community-based seed multiplication, processing, new products, and agricultural inputs, credit availability, and other difficult policy issues.

3.3 HISTORICAL BACKGROUND OF THE NETWORKS

The maize and sorghum Networks (WECAMAN and ROCARS) were launched in the mid- to late-1980s, followed in 1991 by the millet Network (ROCAFREMI) and the WARDA task forces, precursor to the rice Network (ROCARIZ).

The first regional sorghum Network was established in 1984 by ICRISAT and the NARS with USAID assistance through SAFGRAD and became fully operational in 1986 with a five-year program and funding. The mode of operation then consisted of posting ICRISAT scientists in several NARS countries; building the Sahelian Center in Niger; and supporting national stations in Mali, Nigeria, and Senegal. Later a Regional Coordination Unit was created and established in ICRISAT with the objective of assisting the NARS with logistical and technical support (since 1989 in Mali). In 1995, the sorghum-producing countries of WCA endorsed the decision to create a collaborative research Network they named ROCARS (WCARSN in English).

In the mid-1980s, under ICRISAT's aegis, several WCA millet scientists decided to meet in order to (1) establish regular working relations, (2) harmonize working methodologies, and (3) set up exchange mechanisms. The Network was baptized ROCAFREMI (in French) and WACMRN (in English), and financial support was provided by the Swiss Development Corporation (SDC). The ROCAFREMI Network was built on farmers' needs and NARS requests and became particularly strong in the 1990s. SDC wanted to see ROCAFREMI combined with the sorghum Network (ROCARS), but that strategic option was not well received by NARS scientists and has not yet occurred. As a result, the Swiss suspended their financial support, and ROCAFREMI activities have been greatly curtailed as a consequence.

WECAMAN was formally established in 1987 by a group of WCA maize scientists as one of the Networks that evolved from the SAFGRAD Phase II project funded by USAID and became autonomous in 1993. At the outset, all 17 WCA countries were members of WECAMAN, but owing to funding cuts this number was reduced to 8 in 1993 (Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Ghana, Mali, Nigeria, and Togo). However, recently Chad, Guinea, and Senegal rejoined bringing the total up to 11 countries. IITA has served as the executing agency (coordination base), but the Network's coordinator has been mostly based at WARDA in Côte d'Ivoire. The Network's approach from the outset was to honestly appraise the research capabilities of each member country and classify them as either technology developers (and thus lead centers) or as technology adapters, each then assigned different roles and responsibilities within the Network.

In its current form, ROCARIZ is the newest of the four Networks, formally launched in April 2000 at the first biennial Regional Rice Research Review (4Rs) meeting held at WARDA in Côte d'Ivoire. ROCARIZ is the result of a fusion of CORAF's Rice Network and the WARDA task forces mandated in 1998 by the CORAF General Assembly and WARDA's National Experts Committee. Preceding the launching of ROCARIZ, WARDA convened a broadly participative stakeholder meeting to elaborate a five-year strategic plan for the Network (March 1999).

Following the 1996 evaluation, WECAMAN and ROCARS organized internal meetings to prepare five-year strategic plans covering the period from October 1998 to September 2003, which were funded by USAID. The following year, ROCARIZ did likewise. Since October 2003, these three Networks have been operating under "bridging" funds from WARP during a transition period pending the outcome of the current evaluation. As stated above, ROCAFREMI has been without external funding during this period.

3.4 PURPOSE AND PROGRAM COMPONENTS

Not surprisingly, the purpose and overall objectives of these Networks are quite similar.

The stated purpose of WECAMAN was to "pool their human, infrastructural, material, and financial resources to tackle production problems common to countries in the subregion through the development and transfer of appropriate technologies." Its overall objective is to "increase maize productivity, production, and income of farmers through the use of appropriate technologies identified by the Network and extended to farmers by extension services and NGOs in the respective member countries."

The overall goal of ROCARS is to improve the production, productivity, and utilization of sorghum, and to contribute to greater food security and socioeconomic well-being of sorghum producers. The purpose of ROCAFREMI is to help national millet programs better tackle production and processing constraints that prevail within the WCA subregion. The overall goal is to improve the production and utilization of millet and enhance farmers' welfare in WCA countries. The stated purpose of ROCARIZ is to "...continue the strengthening of NARES' capacity and capability for participatory rice research planning, technology generation, evaluation and transfer to end-users."

The primary program components of the Networks consist of the following in some form:

- Collaborative research projects
- Exchange of scientific information and technologies
- Technology transfer
- Human resources development.

All have used research grants, regional trials, germplasm exchange, training programs, monitoring tours, consultation visits, and periodic scientific meetings under these components to achieve their objectives. WECAMAN is the only Network to support a resident research program by its coordinator. Some Networks (WECAMAN in particular) have begun adding impact assessments to the agenda. New programs in processing and new products were also begun in some cases (ROCARS in particular).

Different than the other Networks, ROCARIZ operates under what WARDA refers to as the *task force* mode. Designed to address major constraints, each task force focuses on a particular problem and/or ecology. Currently, the seven task forces consist of the following: rice breeding, mangrove swamp rice breeding, natural resource management, Sahel natural resource management, integrated pest management, technology transfer, and rice economics.

3.5 ORGANIZATIONAL STRUCTURE

All of the Networks operate under organizational structures that are similar in many respects but with a few differences. All have a general assembly made up of the key stakeholders, including NARS scientists and DGs, regional organizations like CORAF and SAFGRAD, the IARCs, donors, and other concerned parties. This group usually meets every other year and provides general guidance and oversight to the Network's programs. The most active decision-making body is the *steering committee*, which is composed mainly of NARS scientists representing the member countries. They often meet twice a year, approve work plans and budgets, monitor implementation, and review progress. The steering committee also usually makes decisions regarding grant awards, though under WECAMAN this function is carried out by an external ad-hoc research committee under the auspices of the steering committee.

The *network coordinator* manages day-to-day operations of the Network, carries out the decisions of the steering committee, prepares and arranges all Network meetings, tours and visits, prepares annual plans and budgets for review and approval by the steering committee, writes progress reports to the donors, and edits and supports Network publications. The

work coordinator ultimately is responsible for keeping everything on track, serving as the communication hub, and energizing and supporting Network members. It is truly a critical position, and most network coordinators have some support staff to assist them. The network coordinator is hired as a full-time paid staff person, often by the host IARC, though from the NARS in the case of ROCARIZ.

Each member country of each Network has a *national or country coordinator*. Country coordinators serve as the point of first contact with the Networks in their respective countries, provide encouragement and oversight for Network activities, help prepare research proposals submitted to the Network and research progress reports, compile annual Network activity reports, and serve as the liaison between the network coordinator and the participating NARS scientists. Many have active programs supported by the Networks. Most are given few if any resources to actually accomplish their job of communicating with Network scientists and monitoring Network activities.

To date, the executing agency or host for the coordination unit of the Networks has been an IARC based in the region (ICRISAT for ROCARS and ROCAFREMI, IITA for WECAMAN, and WARDA for ROCARIZ). They provide the critical administrative and communication facilities; disburse the funds to the NARS for Network-supported research and related activities; participate in Network meetings, monitoring tours, and consultation visits; provide valuable technical backstopping from their large core of scientists; provide training assistance, facilities, and sometimes even funding for attendance by Network technicians and scientists; and help review and edit research publications. For a period, IITA even funded part of the resident research of the network coordinator from its core funds.

3.6 BUDGET

The annual budgets of these Networks have varied considerably among the four and over the past decade or so, but they have ranged in general from \$300,000 to \$500,000. During U.S. fiscal year 2004, the amount has been less than \$200,000 for each of the three Networks funded by USAID, which has obviously reduced the scope and size of program activities, including research grants. More detailed budget information is provided in the appendices and in commentary in Section 4.4.

Three issues should be noted here. One is the amount allocated for the NARS. Often, this is viewed as simply the amount of the research grants that are awarded, but in fact the NARS should also include the amount spent on monitoring tours, training, biennial workshops, publications, and other expenses as being of direct benefit to them. This would place NARS expenditures in the range of 50–60% of the total budget, without counting the costs of the support they receive from the network coordinators. Another issue is the cost of the coordination unit, which is an important function but that some see as too costly, especially when using IARC salaries and benefits. The third issue concerns overhead charges. A common belief is that the IARCs are charging too high a rate and benefiting financially from Network funding. In fact, those rates were found to average 15–20% and covered legitimate support services and related costs (see discussion in section 4.4).

3.7 PROGRESS SINCE 1996 EVALUATION

The record of these Networks over the five years of their strategic plans following the 1996 evaluation report has been impressive. This is exemplified by:

- The large number of research technicians trained, resulting in greatly improved trial management and data quality.
- The large number of research scientists whose skills have been upgraded.
- The substantial number of scientific papers presented at regional workshops and later published (with improved quality over time, peer-reviewed before appearing in the *Proceedings*).
- The number of NARS scientists (several hundred) in the region actively participating in the Networks (funded research, training, monitoring tours, regional professional workshops).
- The number of improved varieties tested regionally (in the hundreds).
- The number of varieties released by member countries (dozens in most).
- The number of new varieties and crop management technologies placed in on-farm tests and adopted by farmers.

Though the amounts granted by the Network to individual research groups of NARS scientists (mostly interdisciplinary teams, seldom individuals) are relatively small (typically \$1,500–\$3,000), these have made a tremendous difference to NARS scientists and national research programs and have made research possible where in some cases it would not have been done. The Team found universal appreciation of this contribution to Network and NARS research, even if the relatively small size of the grants was lamented by some (inadequate funding by the NARS themselves was lamented far more, however). These grants provided the critical margin of difference, and served as a vehicle for cross-region collaboration and communication about common development problems.

Less well known and much more difficult to quantify and document is the real socioeconomic impact of the Networks on the farming systems and the well-being of farm families in the WCA. Assessing impact is complex and expensive, and poses a real challenge to the Networks as well as to the NARS. It is also well beyond the scope of this evaluation. Some data do exist, however, but mostly related to varieties. In some cases—WECAMAN in particular—they do show significant adoption of these new technologies by farmers. And both WECAMAN and ROCARIZ have begun funding impact studies to better quantify and document results at the farm level.

Overall, the Team believes that significant progress has been made by all of the Networks in addressing the general and specific recommendations made in the 1996 report. General recommendations to all the Networks included drafting five-year strategic plans, development of efficient technology transfer models, making investments and institutionalizing the use of e-mail, conducting financial audits of the Network accounts, and expanding participation to include stakeholders beyond the NARS and IARC research community.

The Team found that in general the Networks have done an admirable job of thinking and planning strategically, identifying priorities, and then conducting a collaborative program to attack the main constraints to increased cereal productivity. To their credit, they have continued

to evolve over time in response to changing conditions and the needs of farmers. From a heavy emphasis on plant breeding research, they have moved much more toward technology transfer and expanded into new areas such as post-harvest processing and new product development (ROCARS and ROCAFREMI in particular).

4.0 CROSS-CUTTING ISSUES AND INSTITUTIONAL LINKAGES

4.1 TECHNOLOGY DEVELOPMENT, EXCHANGE, AND DISSEMINATION

The generation and spread of new technologies, including materials and management practices and methods, is at the very heart of agricultural exchange. While the meaning of technology development, or creation, is fairly self-evident, the distinction between technology exchange (or transfer) and dissemination often benefits from some clarification. In this report the Team uses *technology exchange* to denote the movement of a technology and/or management practice or methodology across contexts (inter-regional, -national, -organizational) and *dissemination* in describing the subsequent spread in awareness and access of that new technology among potential end-users. The ensuing act of adoption is viewed as a related but separate event. Beneficiaries of new technologies can include farmers, private sector interests, development personnel of governmental and NGOs, and researchers. The technologies created and exchanged through the Networks run the gamut from new varieties and crop management practices to processing equipment and new research methods.

TECHNOLOGY DEVELOPMENT

Assessing technology development runs into three immediate challenges. The first is answering the question as to whether anything new or improved was created. Did a particular research project produce anything that did not exist before? Such an assessment of new technologies is as much an accounting task as anything else (details on research activities is provided in the networks descriptions in the appendices). Producing extensive lists of breeder names of new varieties, for example, does more to test a project's recording-keeping system than indicate its true productivity or worth. The second, and markedly more difficult task, is one of attribution. Who contributed what, when, and how? In the case of the Networks, which have been highly successful in building linkages and pooling resources among existing research programs, and where there has been extensive use of matching monies and resources, the task of attribution is formidable. In the end, however, neither of the aspects of technology development assessment is important if there is no appreciable impact among the target beneficiaries. This is the last challenge—assessing impact.

Ideally the Team would have been commissioned to conduct an impact assessment similar to that completed for the SAFGRAD networks (Sanders et al., 1994), and to a lesser extent, the 1996 Network evaluation (Mullenax et al., 1996). The Team was not given such a charge, however, and in fact the focus of the current discussions on the Networks does not require these types of inputs. Unlike a decade ago, when little was known about the Networks and there was a widely shared, though ungrounded, impression that they were not having significant impacts (shown to be false) (e.g., Oehmek and Crawford, 1993), the current understanding is much better informed, guided by a general appreciation of the overall under-investment in the sector.

The most important observation that the Team has to make in this regard is that much improvement can still be made in terms of applying state-of-the-knowledge methodologies in generating even greater impacts from the investments currently made. In some areas, most notably post-harvest technologies and processing, there seems to be a high level of participatory en-

agement—bench scientists working with food technologists, working with the private sector, working with consumers. In the more traditional areas of Network activity, such as breeding, the breadth of engagement is somewhat less encouraging. Grain and food quality issues still have not gained the prominence that they deserve in most breeding programs, despite evidence showing that subsistence-first farmers will not grow what they do not like to eat (or what the market does not demand).

Farmer-managed field trials supported through Network grants are being conducted in some cases in villages where extension agents are posted, yet these same agents are not being invited to participate in the evaluation of the varieties with farmers, though they are later blamed for not helping to diffuse the varieties. These problems are systemic issues that run throughout the NARES, and constitute some of the perennial challenges to agricultural research and development. Be that as it may, the Team believes that the Networks are not doing nearly as much as they could to help advance the state-of-the-practice, particularly with regard to promoting the use of participatory research and technology development methodologies. The Networks need to do a better job of identifying and incorporating advanced participatory practices into their programs, perhaps through the assistance of an external consultancy. Targeted training courses and a requirement that Network research grants utilize best available practices in their implementation would help to reinforce progress further.

TECHNOLOGY EXCHANGE

One of the areas where the Networks have all excelled is that of technology exchange—particularly, but not exclusively, in the case of genetic material. The 1996 Network Evaluation (Mullenax et al., 1996) and the 1994 Impact Assessment of the SAFGRAD Commodity Networks (Sanders et al., 1994) singled out the exchange of genetic material as the primary area of network impact, citing multiple examples. WECAMAN provides perhaps the best example of a tightly coupled research-technology exchange program, leading to the widespread distribution of new genetic material across participating countries. More recently, WARDA's increased linking of its INGER-Africa program (International Network for Genetic Evaluation of Rice in Africa), the principal means of distributing WARDA's genetic holding through the region, with ROCARIZ represents another powerful example of the synergism that a fully engaged IARC can bring to a Network. Looking to the future, technology exchange, just as with information exchange among scientists, should continue to be a primary area of Network activity. To the extent that the Networks can make this a regular, explicit, and core part of their functioning will largely define the success that they have in bringing new options and opportunities to the subregion.

TECHNOLOGY DISSEMINATION

As defined above, technology dissemination is essentially a localized process, involving researchers, national extension program, NGOs, specialized development projects, producer groups, individual farmers, and others. Given the high degree of specificity that is required to have significant impact at this level, the Team does not believe that the Networks should play a major role in widespread, frontline technology dissemination efforts. The use, for example, of

Network funds to support an individual researcher in attempting to overcome a failed national seed multiplication and dissemination system by mounting an independent community-based seed multiplication effort is not a good use of financial or human resources. Just as the Networks should not attempt to replace the IARCs in taking on strategic research issues, they also should not attempt to become the WCA technology dissemination portal.

Nevertheless, there is still much that the Networks can do to help technologies diffuse more broadly, more rapidly, and ultimately more successfully through helping to introduce and promote new methods and approaches for technology dissemination and supporting the creation of functional linkages with frontline diffusion efforts. At the same time, the Team cautions against unrealistic expectations or unbridled optimism. Inherent weaknesses in the national extension programs and the complexity of thousands of NGOs and local farmer organizations operating across WCA will largely define the speed and extent to which Network impacts are achieved. Until these constraints are addressed in a complementary manner, the potential impacts of research investments will remain only partially realized.

Overall, the Team believes that the Networks are ideally positioned to have major impact centered around a core of strategically targeted training and technical backstopping efforts. In the following section of this report, the Team spells out the need and potentials of WARP supporting several cross-cutting technology transfer themes in the areas of local farmer-driven seed system development, consolidation and transformation of state-of-the-practice land management knowledge into adult experiential learning modules, and the development of needed processing technologies and new products. Methodologies, such as participatory varietal selection (PVS), community-based seed systems (CBSS), farmers field schools (FFS), and participatory learning and action research (PLAR) are available, field validated and ready for expanded use. The Networks, as well-established and cohesive entities covering the entire subregion, represent a vehicle through which WARP can help support major impact at a fraction of the cost faced by individual bilateral initiatives, and within a timeframe years shorter than any start-up activity. This is one of the under-appreciated powers and assets of the Networks.

4.2 INSTITUTIONAL CONSIDERATIONS

The issue as to whether or not to reorganize or consolidate certain, or all, of the cereal Networks in WCA has been discussed since the funding of the Networks under SAFGRAD II in the late 1980s. In response to the scope of work of the current evaluation (see Appendix G), and the Team's own observations, we discuss three options of network configuration, plus some observations on additional networking possibilities. Each option is presented here using a simplified SWOT (strengths, weaknesses, opportunities, threats) framework. Although no option is perfect, and none are without risks, the Team believes that a change in the current structure of the Networks is both warranted, and in some cases well past due. Overall, we strongly recommend using a sequential, phased approach in implementing any changes. The ultimate decision(s) regarding which changes are to be implemented should be based on a broadly participatory and mutually acceptable compromise among the principal implementing stakeholders, the NARS, IARCs, and USAID/WARP. Anything less risks replicating the failed merger of the ROCARS

and ROCAFREMI Networks, though on a much larger scale. The Team proposes an action plan for advancing these discussions in section 6.0 of this report.

OPTION I: FOUR NETWORKS (MAIZE, MILLET, RICE, AND SORGHUM)

Structurally this constitutes a status quo option of maintaining the four networks as separate entities, although it does assume a merger of the WECAMAN and the CORAF Maize Network. This option would also require WARP to add ROCAFREMI to its basket of funded activities.

Strengths

- Network research and expertise already mobilized and clearly focused
- Utilizes best available knowledge on each individual crops without dilution of resources.

Weaknesses

- The individual crop focus is too narrow, considering the diversity of farming systems that are found in WCA
- Inefficient in that many scientists are involved in several networks
- Increased transaction costs for partners (farmers, extensionists, NGOs, and agribusinesses) who work with multiple crops and must interface with the separate networks
- The administrative and coordination costs for stand-alone network assumed to be high
- Few existing opportunities for synergy between Networks and other scientists.

Opportunities

- Able to go deeper into the specialized needs of each crop
- Flexible and able to easily add, and subtract, dimensions as needed (e.g., storage, processing)
- May be possible to collaborate with other Networks on special cross-cutting issues as deemed useful or necessary.

Threats

- Possibility of reduced interest and thus funding by donors because of a narrow focus on specific crops, especially if network consolidation is expected.

OPTION II: THREE NETWORKS (MERGED MILLET-SORGHUM, MAIZE, AND RICE)

The potential merger between the millet and sorghum Networks has received attention for nearly a decade, due mainly to the high degree of overlap in ecologies and major production challenges. This option holds the view that rice and maize represent unique cropping systems and/or development potential that are best exploited through separate Networks. A variant of this option would be to combine the three upland crops (millet, sorghum, and maize) into a single Network to capitalize on the overlap in production ecologies for millet-sorghum and sorghum-maize in the transition from Sahelian to Savannah/Guinean zone farming systems, with rice maintained in a separate Network.

Strengths

- Greater efficiency would be achieved if scientists combined their work on millet and sorghum owing to similarities in crop and soil management practices and constraints
- Enables the unique characteristics and potentials of rice and maize production and marketing to be highlighted through separate Networks
- Prevents a stronger Network (e.g., maize) from possibly dominating millet and sorghum in a common dryland crop forum.

Weaknesses

- In a joint Network one crop may be privileged over the other, possibly to the detriment of one
- Difficult to find a single institution/location that is equally strong in both crops for Network backstopping.

Opportunities

- Millet and sorghum Network participants can combine their efforts and thus strengthen their impact in key areas such as soil fertility, seed systems, and processing
- Still possible to collaborate with other Networks on special cross-cutting issues as deemed useful or necessary.

Threats

- Reduced funding or problems with the merged Network would impact the research on two crops
- Possibility of reduced overall funding of networks if donors expect greater consolidation.

OPTION III: ONE NETWORK (MAIZE-MILLET-RICE-SORGHUM)

The combination of all four cereal crops into a single consolidated Network offers perhaps the most streamlined management option, while at the same time presenting the highest risks. An alternative of the “single-structure” model would be the creation of a consolidated Network super-structure that could accommodate and support multiple Networks/networking functions. This is essentially the model around which the SAFGRAD Coordination Office was designed and supported under the SAFGRAD II project until USAID withdrew funding in the early 1990s.

Strengths:

- Unified control and reduced transaction costs for engaging Networks
- Potentially lowered coordination costs
- Captures the majority of WCA farming systems in a single Network.

Weaknesses

- Large size of Network may reduce collegiality, creates difficulty in organizing meetings, and monitoring tours
- Network size may dilute efforts on certain crops or issues, as well as the ability to respond to conditions individual countries
- No institution within WCA that is a center of excellence for all four crops.

Opportunities

- Provides broadest possible basis for interactions between scientists and other stakeholders
- Potential for immediate economies of scale in addressing certain problems (e.g., seed systems) and training needs.

Threats

- If things go wrong, networking for all cereal crops across the entire subregion is adversely affected
- Potentially less attractive to other donors to contribute to a single, large program, than more distinct and recognizable efforts.

In addition to the cereal Networks covered by this evaluation, there are many others targeting the same as well as different crops and areas of specialization. Of particular importance are the INTSORMIL, Bean/Cowpea, Soils, and SANREM CRSPs, as well as the Inter-CRSP West Africa Program; the new CORAF Agricultural Policy Network (REPA); and the PRONAF Cowpea Network. In addition, there are a number of complementary project-based activities, such as the Initiative Mil-Sorgho that was funded by IFAD, SG2000, and the French Development Cooperation. To the extent possible, WARP and the other Network stakeholders should encourage and support the development of cross-program collaboration with these other initiatives. The risk in not doing so is a diffusion of effort and competition over the subregion's scarce human resources—the antithesis of what *networking* attempts to achieve.

Even the brief SWOT analysis presented above makes clear that there is no immediately obvious, single best solution in terms of Network organization. Each option has its strong and weak points. In general, and as will be elaborated upon below, the Team believes that continuing to focus on individual crops masks some of the most important elements of future Network potential. Before joining this discussion, however, it is important that the Team reemphasize the need to follow an inclusive and consensus-building process in discussing and introducing change to the Networks. We believe strongly that decisions regarding possible changes to the Network structure should remain goal oriented, guided by sound information and key principles. Members of all of the Networks reported feeling a high level of NARS ownership in their respective networks. Maintaining and strengthening this sense of ownership will be key to en-

sure the future productivity and sustainability in each of the Networks. Hasty, externally imposed and/or politically driven decisions must be avoided because they will likely undermine the cohesiveness or otherwise adversely impact the Networks. It should not be forgotten that the high level of operational success shown by the Networks today is the result of more than 15 years of sustained investment and internal consolidation.

In the past, the Networks have been criticized for an overemphasis on plant breeding. A review of their current programmatic content shows that much progress has been achieved in engaging a broader set of issues. This degree of responsiveness is a positive sign, for as indicated above, the most pressing current and future challenges are not those that will be met through a breeding focus. Four areas where the Networks have provided key services in the past, and where they could do much more in the future consist of the following:

1. **Genetic Material Exchange:** The ability to have regular, effective, and highly accessible means of transferring genetic material among researchers within the subregion is critical. The Networks have been highly successful in filling this role, and this should be continued. In the case of millet, sorghum, and, to a lesser extent, rice—crops for which West Africa is a center of genetic origin and diversity and where imported material has had limited impact (especially true for millet and sorghum)—the ability to exchange and test indigenous and improved material in new locations takes on an even greater importance.
2. **Seed System Support:** For all crops, the ability to locally select and diffuse new genetic material is a major challenge, and one that the Networks have begun to address, although indirectly. National research programs, and individual breeders, who are supporting most of the seed diffusion activities have limited capacity to generate broad-based impact. In addition, most extension programs have been excluded from the process, and even if involved, do not have appropriate operational models to be effective in facilitating a largely farmer-based seed multiplication and diffusion effort. Virtually all the IARCs have begun to promote and use variants of the PVS and CBSS approaches. WARDA and, to a lesser extent, ICRISAT, have played a leading role in this regard, having trained at least two scientists (one breeder and one social scientist) in each country within the subregion, and provided funds for initial field testing of the approaches. This is certainly an area where the Networks could, and perhaps should, play a much more proactive role.
3. **Processing and Product Development:** The ability to develop new products and create greater market pull for bulk grain production will likely define the future challenges of increasing cereal production, especially for millet and sorghum. In the case of rice, needed

Key Themes

During the course of its assessment, the Team identified a number of key themes that cut across all of the Networks and form some of the major challenges constraining increased cereal production and agricultural incomes in WCA. These themes include:

- ◆ The status of the growing environment (soil health and land management)
- ◆ The availability of superior genetic material (seed selection and availability)
- ◆ The ability to market production (superior processing and new products).
- ◆ Other important themes that lay outside the scope of the Networks, or which are the focus of other efforts, include such issues as credit, input supply, market information, basic infrastructure, and policies.

changes in the policy environment, related to the dumping of cheap Asian exports along the coastal states, is a major issue that remains to be dealt with, perhaps through collaboration with the Agricultural Policy Network (REPA) located in Dakar near CORAF's headquarters. In the case of maize, the development of industrial uses within the subregion, similar to those in other areas of the world, will likely be a key in defining future markets for maize and thus demand as well as price levels for additional production. Both sorghum and maize have potential in growing animal feed markets and the brewing industry. Although the Networks (in particular ROCARS) have had some success in this area, an overall sharper focus on post-harvest, grain processing, and product development issues is an area on which the Networks should concentrate much more.

4. **Enhancement of the Crop-Growing Environment:** Despite the heavy emphasis in the past on breeding, the greater need today is to consolidate and disseminate best practice information regarding the enhancement of crop-growing environments for cereal production in all ecologies found across the subregion. Best soil and water management practices include a mix of indigenous and research-generated management practices. Many focus on improving soil fertility, particularly nitrogen and phosphorous, which is almost universally deficient and a major constraint to higher yields in the cereal growing areas of the WCA and which diverse cereal-legume associations and rotations help offset (at the same time often reducing crop losses due to *Striga*).

The major challenge will be in making the appropriate information broadly available to farmers through the multitude of national and NGO programs in a form where farmers absorb and integrate the most relevant elements into their own practices. In the experience of the Team, the learning-based and farmer-centered approaches are most capable of doing this, as perhaps best exemplified by the many successful FFS programs (it is recognized that not all are successful, due to some important but known reasons). This in general is an area where the Networks could provide a major service.

An approach to both preserving the independence of Networking priority setting and functioning, while at the same time enabling USAID to achieve a much higher degree of development impact in the key areas outlined above, would be to support *additional* technology transfer efforts in the following three key areas:

1. Seed system development
2. Post-harvest processing and enhanced value-added crop utilization
3. Development of adult learning modules focusing on improving the cereal production environment.

The Team believes that these are areas where WARP's contribution would make great sense, especially in terms of contributing directly to achieving the objectives of the IEHA.

One approach—and perhaps the most efficient—to making rapid gains would be to hire several highly capable individuals to spearhead development efforts in each of these areas. To be effective, persons hired should be of the highest qualifications, and should be based within

appropriate organizations where they can most effectively provide the technical leadership for subregional efforts in their reference areas. These individuals should work with and through the Networks, yet should have access to additional discretionary funds to support the development of targeted areas of Network activities. The basic concept would be to fund one or more specialized technology transfer positions in order to make rapid gains with regional impact through the Networks.

The question remains, however, as to how the Networks can best organize their activities in order to capitalize on these new possibilities while maintaining their established strengths. On the one hand, beyond the potentials of combining one or more Networks, as outlined earlier, the existence of major cross-cutting challenges (e.g., seeds, processing) suggests the possibility of reorganizing the Networks around these themes, rather than the vertical crop-based *filière* approach as has been the case until now. On the other hand, the *filière* approach has several advantages, not the least of which is the ability to provide continuous A–Z coverage of a single crop without the need to negotiate inter-Network boundaries.

Overall, the Team urges caution in approaching the issue of Network configuration. While organizational boundaries are necessary to create identity and an operational structure, in general they should be kept to a minimum, especially along the most important lines of functional exchange. With this in mind, and despite the inherent attractiveness of a new organizational structure, the Team does not see a sufficiently convincing argument for creating new Networks or reconfiguring the Networks along discrete activities at this time (e.g., seed production network, processing network). Currently, the greatest challenges and most important barriers to overcome are those found between segments along individual market chains (i.e., matching up the right variety with a marketable product). This would suggest that Networks should be organized along the same dimensions. At the same time the importance of similar constraints—such as the struggle to make improved varieties locally available—highlights the need to devote more effort in addressing common issues. The Team views the identification and development of coordinated, internetwork programmatic responses to key cross-cutting challenges (outlined above) as an entirely new, and much needed, area of future Network functioning.

In the long run, formation of a single Network structure may hold the greatest promise for fully developing the potentials of market chain and horizontal theme-based activities discussed above. To arrive at this end, the Team believes that the surest path to success is one of phased integration that allows for adjustment, learning, and growth. The Team hesitates in being over prescriptive in the areas of Network configuration and internal emphasis. Although changes can be suggested and strongly encouraged from the outside, they ultimately must be felt and acted on by those on the inside if the vital aspect of NARS ownership is to be maintained.

The Team believes it is important to reiterate its belief that far from being a period dominated by transition and change, the next phase of Network activities has the potential of producing some of the most dramatic and significant impacts in WCA that the Networks have generated to date. Constructive advances in the areas outlined above—seeds, soils, and markets—have the greatest potential for leading rapid and broad-based (geographically and in term of crops) gains across the subregion. This is not a time to slip into dormancy, but rather one calling for dynamic action. Sustained commitment and additional resources will be needed to allow the

anticipated changes to take hold and deliver results. It is not evident to the Team that merging Networks will result in much or any significant savings on administrative costs (see discussion in section 4.4), nor should donors look at the options of Network consolidation as a signal to reduce the overall budgets. Rather, the challenges and potentials for impact that lay ahead demand greater, and more focused, support.

4.3 CAPACITY BUILDING

The interviews with NARS scientists and directors revealed an intense desire by many to receive more and larger research grants. Given the insufficiency or absence of operational funds from their institutions that many scientists are facing, such a desire is understandable. With regard to the Network, the common complaint is that current grant sizes do not cover the full cost of the trials. Yet, remarkably most trials are completed. When put to the test, researchers have shown a high degree of skill in combining resources from other sources and leveraging small, and not so small, sums from their home institutions, in addition to becoming very judicious in their use of available resources. Although difficult to quantify, the Team estimates that by forcing researchers to seek additional funds, the small research grants provided through the Networks have effectively leveraged a significant amount of financing for agricultural research that otherwise would not have been forthcoming, matching and perhaps exceeding the amounts allocated by the Networks.

If grant sizes were substantially increased to cover the full costs of research, it would eliminate the motivation and necessity for researchers and their supporting institutions to make substantial contributions, resulting in a diminished commitment to supporting and financing the national agricultural research agenda. Nor does the Team recommend eliminating the use of small research grants. The benefits in terms of productive output, additional leveraged resources, and increased activity of investments in research staff and facilities that otherwise would sit idle are simply too high. **That said, the Team strongly recommends that the grants provided, both in terms of number per country and their size, be kept at or slightly above their current size for most Networks with some adjustments.** Within ROCARIZ, for example, the grant size in 2004 had fallen too low (a few hundred dollars) and became ineffective as either a research tool or source of resource mobilization. Furthermore, as in the case of ROCARIZ, the Team recommends that each of the Networks consider the introduction of appropriate requirements for NARS matching funds (excluding staff salaries, facilities, and items already provided) on all research grants.

Strong research programs are built from the ground up and from the inside out. By requiring NARS to make explicit commitments of support at the level of individual research trials, the Networks can play a valued role in helping build the basis for true capacity in sustaining national agricultural research programs. To be successful, this requires that donors such as WARP exercise constraint and chart the difficult path of keeping pressure on individual countries to continually face difficult decisions, while ensuring that such beneficial functions as subregional research networking continue to operate in order to bring maximum value to the growing investment made by the individual NARS.

To further assist critical capacity-building objectives of the Networks, WARP may consider creating a small but significant competitive Network Assistance Fund that would be located outside of, but accessible to, each of the Networks. Such a fund would provide the additional resources needed to conduct, for example, more extensive training courses or extra-regional study tours on high-priority issues that cannot be covered through the normal Network operating budgets. Management of this fund could be provided by CORAF, or a CORAF-based Network oversight committee (discussed in the following section). Applications to use this fund would be open to all Networks, not individuals within them. This initiative would have greatest impact if training requests were implemented in coordination with a larger strategy to strengthen the subregion's agricultural universities in line with the recommendations of the BIFAD report *Renewing USAID Investment in Global Long-Term Training and Capacity Building in Agriculture and Rural Development* (BIFAD, 2003).

4.4 NETWORK ADMINISTRATION AND MANAGEMENT

The management issue that has drawn the greatest attention and most animated exchanges concerns the coordination of the Networks and specifically which institution(s) should serve as the Network host(s)—the CGIAR centers (the current model), NARS, or CORAF. Interestingly, the consensus at the time of the 1996 evaluation was that Network coordination should be maintained by the International Centers (ICRISAT, IITA, and WARDA). In the intervening years there has been an obvious change in the attitudes of some regarding this issue.

Although difficult to quantify, the Team perceives that some of this change is likely linked to the difficult times that the NARS and key CGIAR centers have faced in recent years. The steady drop in donor financing of agricultural research has made the NARS increasingly sensitive to funding issues (Kane and Eicher, 2004). The similar decline and changes in IARC funding has undoubtedly affected the relationships of CG Centers with the NARS as well as the nature of their participation in the Networks. By the end of the 1990s, ICRISAT was on the verge of closing the doors of its Sahel station, home to ROCAFREMI, and had removed all of its core scientific staff.

Similarly, early in the new millennium, ICRISAT was also rumored to have considered closing its Samanko station in Mali, home to ROCARS, and had begun to scale down the resident research staff. This same period also saw major disruptions to WARDA caused by the outbreak and escalation of violence in Côte d'Ivoire, and the eventual transfer of most of WARDA's research staff to the ICRISAT station in Mali (where WARDA now rents space). These events were accompanied by widespread turnovers among WARDA senior researchers. Although WARDA is now implementing a return to its headquarters in Bouaké, the situation is by no means normal.

That all of these programs have seen a reversal in fortunes is a very positive sign for the region. However, this revival is characterized by some disturbing trends. The build-up of research staff at ICRISAT has emphasized post-docs and more junior scientists, as well as those supported entirely by donor projects, rather than core funds. In the case of WARDA, several positions are now occupied by scientists who are not specialists in rice, or in some cases, the core

discipline of their positions. The overall result, whether perception or reality, is that the irreproachable image of the CG centers as seats of intellectual excellence is now questionable.

The Team believes that each of the CG centers (ICRISAT, IITA, WARDA) needs to take a hard look as to whether they have the capacity and interest in continuing to provide backstopping—administration, management, and scientific—for the Networks in question. On the one hand, these Networks were established in part to help provide a living bridge between the CG centers and the NARS. And in that regard they have immense value. Each of the centers now has a long history of involvement and can provide ample written testaments as to their belief in the value of Networking, as well as demonstrate impacts. On the other hand, the Team is not convinced that all of the centers currently treat the potentials offered through the Networks with the appropriate seriousness and respect; to a degree, complacency appears to be replacing sincerity. The issues are simply too important to approach half-heartedly. For the IARCs to win back the hearts and minds of their NARS colleagues, the Team encourages WARP to challenge each of the CG centers to renew their commitments to working with and through the Networks.

Some have argued for the relocation of Network coordination out of the CG centers to either CORAF or a strong NARS. The central arguments are that the NARS are now capable, in terms of human capital and management systems, of hosting the Networks, and that they can do so at much reduced cost compared to the CG centers, sighting figures of 28% overhead charges and overall management costs of up to 65% of the total Network budget.

Addressing the cost issues first, although the Team was not able to get full documentation for each of the Networks, the true overhead rates and levels of assumed management costs are far less than commonly believed. In the case of the original ROCARIZ proposal submitted to USAID by WARDA, a rate of 13% overhead was used. Similarly, ICRISAT received an average of 15% overhead for its hosting of ROCAFREMI (a weighted average of 22% for ICRISAT-managed activities and 6% for pass-through funds). The WECAMAN Network coordinator indicated that IITA uses a flat 18% overhead rate. The Team was unable to get exact financial figures for ROCARS, although a similar weighting formula as used with ROCAFREMI is applied.

Clearly, however, the criticism being repeated by many concerning the exorbitant overhead rates being charged by the CG centers is not substantiated by these figures. In fact, the reported overhead rates used by each of the NARS visited in this evaluation range from 10–30%, with an average of 15–20%, essentially the same as those applied by the international centers. CORAF's overhead rate is unknown. In addition to the overhead rates charged, one also needs to ask the question whether the services provided by the different organizations are of equal quality and value. In many cases, and particularly in the areas of communication services and financial management, the answer is no.

In looking ahead, it is important to note that greater aggregation of Network activities, resulting from the merger of two or more Networks, will also concentrate the demands for administrative support, which in turn may lead to an increase, rather than a decrease, in actual administrative costs charged to the Networks. Interviews with ICRISAT's head of finance, for example, suggested that the true administrative overhead costs may in fact be higher than those currently being charged to the Network budgets. While a CG center might be willing and able

to absorb a certain amount of additional administrative costs for a program that it is closely associated with its core mission, *gratis*, if this burden becomes too heavy, as might be expected from a merger of two or more Networks, the hosting institution may need to seek additional compensation. The assumption that Network consolidation will lead to greater administrative efficiencies and therefore significant costs savings warrants close scrutiny. The reverse may very well be the case.

The overall *Network management costs* is another area that seems clouded by misunderstandings and a lack of factual information. It is true that when one looks only at the amounts given directly to NARS scientists as Network research grants, and assumes that the remainder is Network management, the costs seem exorbitant: 74.5% for ROCAFREMI, 72.5% for WECAMAN, 72.3% for ROCARS, and 64.5% for ROCARIZ. Yet on closer consideration, in addition to covering the salaries of the coordinator and costs of convening the steering committee, these funds also support some of the most beneficial, networking activities such as the biennial Network meetings, monitoring tours, publications, and training opportunities for NARS scientists and their technicians. When asked to list the most beneficial aspects of Network participation, the 140+ NARS scientists interviewed by the Team responded, almost to a person, that it was the ability to communicate and exchange information, experiences, and ideas with their peers. The value of such exchanges has been a hallmark of Network contributions to the subregion since their inception (Bingen et al., 1991). Lumping the cost of supporting such activities under the heading of overall Network management is certainly misleading.

As a point of historical fact, NARS scientists under the original SAFGRAD II funding received 13–15% of the total budget for research trials (Bingen et al., 1991). That a decade later NARS scientists are receiving between two and three times this percentage, and from overall Network budgets that have been greatly reduced, should be viewed as a major accomplishment. This is not to say that more cannot be done, but the implication that the Network operating budgets serve as a major “cash cow” for the CG centers is false. Conversely, other institutions interested in hosting Network coordination must closely consider whether they are capable of meeting the same management and administrative requirements under the existing budgetary framework.

The bottom line in considering where to base Network coordination is, as articulated by the FARA executive secretary, the “ability to deliver.” The ability to deliver, in timely fashion, the necessary services required by the Network members to achieve their objectives should be the principal gage in assessing any institution’s suitability to host Network coordination. The following are the key factors (capacity) that the Team considers necessary for effective Network coordination:

- Excellent communication facilities, especially reliable and consistent access to high-speed Internet connectivity, for e-mail and Web page management
- Demonstrated transparent and efficient administrative procedures with minimal bureaucratic red tape

- Strong, proven financial management practices (budgeting, accounting, timely receipt and expense processing and reimbursement, rapid receipt and transfer of funds, internal audit capabilities), with at least some experience in supporting activities of a subregional nature
- Ability, if necessary or requested, to pre-finance grants to Networks throughout the subregion
- Strong and broad scientific and research institutional capacity, with active research programs on the crop(s) and cropping systems indicated
- Good logistic and transportation support (easy, priority access to vehicles and good international travel links)
- Suitable documentation (library) and publication facilities
- Bilingual (French-English) capability of main support staff
- Independence and autonomy allowed to the Network coordinator, especially in terms of Network policies, decision-making, programs, and travel arrangements.

Whatever institution is selected to provide and/or serve as the coordination base should be asked and willing to sign a memorandum of agreement (MOA) with the Network(s) and donor(s) that explicitly lays out and codifies the expectations and the kinds of arrangements that are critical to the Network's success. Such an MOA will be in everyone's best interests, helping to eliminate misunderstandings, disagreements, and confusion.

Appendix J contains the Team's assessment of the major Network partners and other key institutions within the subregion (NARS, IARCs, FARA, CORAF, SAFGRAD, and ROPPA) with regard to their suitability in serving as a base for Network coordination. In the end, on the basis of this assessment, consideration of the key criteria and other recommendations outlined above, as well as additional observations that are presented in the following section on financial sustainability, the Team believes that for the time being the CG centers, if they are willing, should continue to serve as the principle base for Network administration and management. The exception might be in the case of a combined Millet-Sorghum Network. Consideration of alternative host institutions, however, should be closely scrutiny based on the criteria outlined above.

Largely obscured by the discussions over where to situate Network coordination are a number of very important issues concerning the inner workings of Network management. As described in the preceding section summarizing each of the Networks, Network management is at present partitioned across three major components: a general assembly, steering committee and coordinator, with the somewhat hidden influence of the hosting CG center. Although NARS representation dominates all of the general assemblies and Network steering committees, only one of the Networks has a true NARS coordinator, ROCARIZ. The Team believes that is not only possible but highly desirable for the other Networks to also look to their pool of NARS scientist in selecting new coordinators. We also believe that these individuals should fill the coordination position on a rotating basis, with perhaps an initial two-year appointment that is open to a possible one-time three-year extension. This would enable a series of individuals to gain the invaluable experience of serving in a regional capacity, and for a long enough period of

time to become effective in their duties, while at the same time ensuring that a renewal of “fresh blood” preserves the NARS perspective.

Overall, the ROCARIZ model, while not perfect, offers perhaps the best general template for the next stage in Network development—a coordinator, selected from one of the lead NARS programs, hosted by an IARC in order to take advantage of the regionally orientated support services. In the future, it may be possible and desirable for individual NARS programs to begin to serve as the hosting institution, but until the major internal needs within the NARS are being met, and the NARS can provide all of the services required by the Networks, the Team believes that this move is premature.

The Team hesitates to recommend the addition of any new institutional layers, believing in general that, as far as research administration is concerned, less is more. However, the current Network structure lacks any real connection to CORAF, the subregional body charged with research coordination. The participation of the CORAF scientific adviser as an observer on the Network steering committees does not sufficiently improve research coordination. Therefore, the Team suggests that, in their deliberations in charting the way forward for the next phase of Network development, Network stakeholders consider the creation of a CORAF Network oversight committee composed of NARS research directors drawn from the CORAF general assembly. The primary responsibilities of this body would be to review and approve the Network strategic plans and annual work plans, to provide the forum, along with other donor and IARC representatives, for reviewing and selecting Network host institutions, and to ensure that Network internal procedures are followed.

The result of these changes would be a Network, led by a NARS coordinator, reporting to a NARS-dominated steering committee and general assembly, vetted by a NARS directors oversight committee, and for the foreseeable future housed in a highly capable CG center to take advantage of its administrative and communication facilities and to strengthen NARS-CGIAR research linkages. This would give NARS major management responsibilities at three key levels: strategic planning, implementation, and oversight. The Team believes that maintaining a structural link with the lead CG centers, through their continued hosting of the Networks, will be key to keeping the centers engaged as broadly as possible in regional collaborative research. Without some structural tie to the Networks, it is likely that regional IARC-NARS engagement would diminish, contributing to a self-fulfilling prophecy of distance and separation. Given its significant investments in the CG system, as well as the Networks, USAID in particular has a vested interest in seeing these two bodies work closely together.

Ensuring alignment of Network priorities with those of participating national programs has been a chief concern for CORAF. The Team, however, believes that an equally important emphasis has yet to be placed on ensuring that the research priorities of the Networks correspond to concerns of farmers, as well as the interests and needs of other stakeholders such as processors. This second challenge has yet to be fully engaged by any of the Networks. As ROPPA develops and matures, the Team would encourage their involvement in Network deliberations to help provide the perspectives of farmer’s organizations in WCA and a counterbalance to existing views.

A last management issue that warrants discussion here concerns both USAID and the Network coordination centers. During nearly all of the NARS that the Team visited, the issue of difficulties in the transfer of funds was raised. This is not a new problem and the negative impacts are huge. The 1996 Network evaluation identified and addressed this issue at length. Unfortunately, no appreciable progress seems to have been made. Funds transferred from USAID to the IARCs arrive late, requiring the IARC to pre-finance activities. The IARC's transfer of funds to the NARS using checks drawn on U.S. or European banks causes delays of up to a month because the checks are sent out of the region for clearance. In the end, it is the scientists who suffer. The agricultural calendar does not wait on bureaucratic process. The Team does not have any ready solutions to resolve this problem, other than perhaps for the CG centers to consider using Western Union, or direct wire transfers in disbursing funds to the NARS. USAID, on the other hand, needs to closely review its own funding procedures to identify a means for meeting its financial commitments in a more timely manner. The possibility of heavily weighting Year-1 funding and allowing the IARCs to carry forward an amount adequate to cover NARS research grants would be one option. This issue cannot be allowed to persist, and the Team strongly urges WARP to meet with Network, IARC, and NARS leadership to identify solutions.

4.5 FINANCIAL SUSTAINABILITY

Despite desires to the contrary, the reality is that without donor financing, none of the Networks as they currently exist could support their own operation. In this regard, little has changed since the last evaluation, which reached the same conclusion. Nor is this surprising. Despite ROCAFREMI's (unsuccessful) search for a financial partner, WARDA's securing a grant from the EU and WECAMAN obtaining supplementary funding for limited periods from the United Nations Development Programme/IFAD and the Nippon Foundation, the Team found no clear evidence that the Networks have been challenged with developing their own financial base. Even if they had been, the prospects are not good. Other higher profile, subregional efforts are encountering great difficulty in mobilizing resources from within the subregion to fund their activities. CORAF and WARDA, for example, each solicit member contributions, but neither could support more than a fraction of their activities on the funds received by member countries. The figures reported in WARDA's annual reports show that, after peaking in 1996 and 1997 at around US \$380,000, the annual contributions to WARDA by member countries have continued to drop to their current levels of nearly \$120,000, or just over 1% of WARDA's annual operating expenses (WARDA's annual expenses were \$9.8 million in 2002).

CORAF is faced with a similar situation. By 2003, the number of CORAF's 21 member countries making financial contribution had fallen to 3 (Fraisie, 2004). CORAF is now teetering on the edge of bankruptcy as it awaits the next injection of funds from the EU. One of the other African SROs, SACCAR, has reportedly gone under due to the failure of member states to meet their commitments as donors completed a planned phase-out of financial support.

NARS are not in a position to make additional financial contributions to the Networks for the simple reason that they themselves are underfunded. Sadly, outside of donor-supported activities, the Team found little evidence in the programs visited of an effective balance between investments in staff, facilities, and the provision of operational funds. A startlingly number of

NARS scientists interviewed, as well as many of the NARS directors, cited that there were few or no resources available from their national programs to support operational research activities. This problem, mentioned in passing in the 1996 evaluation, seems to have grown. The Networks with their modest levels of funding can add value to the investments made by NARS, but they cannot compensate for a lack of national will and fiscal commitment. In fact, without a strong national program, a country's ability to benefit from Network participation and investments is markedly diminished.

Against this backdrop, and for the foreseeable future, the financial sustainability of the Networks will be tied almost exclusively to donor contributions. Even if the scope of activities was greatly reduced, donor financing would still be required. The Team views this situation as less a failure, or weakness, particular to the Networks, than a reflection of general conditions within the subregion. On the other hand, the Networks represent a highly efficient and effective means of contributing to the broad agricultural development goals of WCA. Thus, the Team speaks with a single voice when it urges that WARP continue supporting the Networks.

An appropriate strategy for WARP given USAID's long history of Network support would be to take a leadership role in working within the donor community to build a broad and sustained base of support for regional initiatives. Bilateral donors, such as the SDC, which funded ROCAFREMI for over a decade, may be persuaded to re-engage with USAID and others in defining a next decade of Network support. Others, such as IFAD, SG2000, and French Cooperation, who funded the overlapping Initiative Mill-Sorgho (IMS), may be interested in joining forces with a regional effort, as may the Asian Development Bank and others. WARP should also work at a policy level through the bilateral, regional, global (e.g., Millennium Challenge Account) initiatives to address the fundamental problems of insufficient national investments in national agricultural development. CORAF specifically should be challenged with engaging the Council of Ministers of Agriculture in WCA to address the key issues of inadequate research support and/or partitioning of available funds.

The lack of an agreed-on activity profile for the Networks makes identification of a realistic funding target arbitrary at best. In general, however, the Team believes that it would be highly desirable to support the Networks at a pre-bridging period level, assuming that their activity profiles continue to comprise the essential Network functions (exchanging and testing technologies, sharing information and ideas, capacity building) as well as more effectively addressing important emerging issues as specified earlier (processing, seed systems, production environment).

Ideally, there should be a commitment to long-term support to enable the Network to engage in rational planning and to carry out substantive program development activities. The Team recommends that WARP consider at least two five-year phases. Shorter funding cycles, based on the assumption (generally false) that low-hanging fruit can be rapidly harvested at a high rate of return, fail to appreciate the time lags and transaction costs of working through multinational, multi-institutional, collaborative research consortia. The Networks purposefully embody both, and require sufficient time to deliver the results that are sought.

Ideally, given availability of funding and the decision to maintain Networks close to their current form (including the suggested mergers), the Team would envision:

- Three adequately funded networks
- The addition of several technical assistance positions to spearhead and rapidly develop key areas (enhanced production environments, seed systems, processing, and new product development)
- The creation of a competitive, noncommitted, support fund to enable the technical assistance and Networks to undertake activities that lay beyond the scope of their current means.

The required funding for these three components is estimated roughly at around US \$1.3–1.5 million per year.

5.0 SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS

As requested by WARP for purposes of brevity, section 5.0 is presented in summary form. The original, more detailed version is provided in Appendix K. Readers are strongly encouraged to refer to that appendix for a more in-depth explanation and rationale of each major finding and its link to each recommendation

■ **FINDING 1.** The history of the agricultural research Networks in WCA shows a strong record of major, sustained investment and support by USAID that is widely recognized and appreciated within the region.

RECOMMENDATION 1. WARP and its key partners should carefully review the remarkable history and achievements of agricultural research Networks in WCA, with a view to making their decisions regarding the future of the Networks within the larger historical context and longer term development goals and vision of the region.

■ **FINDING 2.** The Networks have amply demonstrated their importance and value to regional, collaborative agricultural research and development in WCA, making them well positioned to contribute significantly to the IEHA.

RECOMMENDATION 2. The current investors (NARS, IARCs, USAID, CORAF) should continue, if not increase, their support for these Networks by making a reasonably long-term funding commitment, subject to the Networks' continued evolution in response to changing needs of farmers and others in the cereal subsector, increased impact, and periodic review and assessment.

■ **FINDING 3.** It is difficult to fully and accurately assess Network impact on account of insufficient data, and this poses a problem for the Networks as they seek to make the case for increased financial support.

RECOMMENDATION 3. The Networks should work together and in conjunction with the NARS to develop systems to collect and analyze the necessary data to better quantify the socioeconomic impact of Network activities at the farm level.

■ **FINDING 4.** The full and active involvement in the research process by farmers (the primary client and targeted end-user) has shown its great value in helping ensure that research specifically addresses and focuses on farmers' needs and constraints (demand-driven, not supply-driven research), thereby resulting in higher rates of adoption of new varieties and other technologies truly suited to the specific circumstances of farmers.

RECOMMENDATION 4. The Networks should much more strongly encourage and promote the application and use of farmer-participatory methods in all future Network research programs, with the expectation of spillover of these approaches into national research programs.

■ **FINDING 5.** There continues to be a widespread lack of good Internet connectivity throughout much of the WCA, a situation which impedes the ability of Network scientists to communicate with each other and the rest of the agricultural R&D community.

RECOMMENDATION 5. USAID, CORAF, FARA, and others interested partners should undertake, with a sense of urgency, a study on the technical and economic feasibility of establishing and maintaining satellite linkages for key research stations and groups throughout the region.

■ **FINDING 6.** African universities seem largely uninvolved in Network programs, which is a lost opportunity for both and a detriment to WCA farmers.

RECOMMENDATION 6. The Networks should make specific plans to establish linkages with training and research programs in the African university community.

■ **FINDING 7.** Despite the valued services and functions provided by the Networks, their accomplishments and apparent impact to date, and their demonstrated cost effectiveness, national governments in the region have not yet summoned the political will, nor found the necessary means internally, to begin funding Network research on their own.

RECOMMENDATION 7. The NARS, individually and collectively (through CORAF), should find new and persuasive ways, through the influence of their combined strength and within the auspices of NEPAD, to appeal to national governments to change their policies related to funding of national research and, as a start, to cover the costs of some of the Networks' research programs.

■ **FINDING 8.** R&D progress made by the Networks to date, together with changing conditions in the region as well as the evolving needs of farmers and others in the cereal subsector, require new strategic directions, programs, and partners.

RECOMMENDATION 8. The Networks should carefully review the balance between funding research and technology transfer in their programming as well as the creation of internal synergies between activities to maximize opportunities for vigorously moving promising technologies into the hands and fields of farmers.

■ **FINDING 9.** New areas of emphasis of the Networks would benefit greatly from additional specialized expertise to ensure rapid initial progress and near-term results.

RECOMMENDATION 9. USAID in conjunction with other donors should consider funding, for a limited period of three to five years, three internationally recruited scientist positions to provide regionally oriented, Network-connected support in the areas of seed systems, post-harvest processing, and improved production environments.

■ **FINDING 10.** As the Networks assess and embark on new strategic directions, this provides an excellent opportunity for thinking creatively about program emphases, new partnerships, and potential cross-network activities.

RECOMMENDATION 10. In their next phase of development, the Networks should begin to consider a larger vision and build areas of programmatic cross-network activity.

■ **FINDING 11.** Many serious and thoughtful ideas have been expressed by USAID and the key Network partners about the best way to move forward in reconfiguring or combining (or not) the existing Networks and in considering where to locate the Network Coordination Units.

RECOMMENDATION 11: The leadership of the Networks (ROCARS, ROCAFREMI, ROCARIZ, and WECAMAN), working in conjunction with CORAF and WARP, should design and facilitate a process, based on consensus and compromise, for arriving at a set of changes to the Networks' configuration and coordination base.

6.0 PROPOSED PLAN AND PATHWAY FOR IMPLEMENTING THE RECOMMENDATIONS

On the basis of the Team's conclusions and the recommendations and observations elaborated above, it is clear that the Networks are at a crossroads where a number of important decisions need to be made to secure their futures, especially in terms of strategic direction and organizational structure.

The Team underscores the fact that significant focus has been placed on developing and supporting Network self-determination, which defines in many ways the high level of "ownership" that nearly all participants report. Strong local ownership will be key for the Networks as they negotiate the challenges before them, seek to maintain high levels of relevancy to national research agendas, and build the prospects for future sustainability of Network functioning.

To encourage and support this kind of Network-run and -owned planning process, the Team strongly recommends that WARP and CORAF organize a *joint networks workshop and planning meeting* to discuss the Networks, review options, and reach a consensus on the future organization and direction of the Networks. The Team suggests the decision-making process and timeframe outlined below.

WARP would request that CORAF organize the proposed planning meeting with funding provided by USAID and contract the services of an independent, nonpartisan group to help plan and organize the meeting and to serve as facilitators and rapporteurs during the meeting.

It is important that the group attending the meeting not be too large, but with sufficient representation to make decisions on behalf of the Network. Individuals involved will need to be able to reach compromises and to be decisive on a number of tough, complex issues over a relatively short period of time. Convening joint extraordinary sessions of the steering committees of each of the Networks would seem the most effective and logical decision-making mechanism. The legitimacy and credibility of the steering committees will be key to the success of the meeting and to the widespread acceptance of the ultimate Network plan adopted.

The Team does not believe there are enough resources available nor sufficient time to convene the general assemblies of each Network to review and approve the new plan. Furthermore, non-adoption by even one of the Networks could be disastrous to the overall efforts to support needed evolution in Network activities. It is therefore essential that decisions made and the plan formulated by this core group be considered official and final, and effective as of a date certain, by all four Networks simultaneously.

In addition to the steering committees of each Network, the Team recommends that a number of "observers" be invited to participate in at least some of the sessions, but not all and not as voting members. Besides CORAF and USAID, this might include SAFGRAD, INSAH, ROPPA, Conference of Ministers of Agriculture, African Development Bank, IFAD, EU, Swiss Development Corporation (former funders of ROCAFREMI), Japanese International Cooperation Agency, Canadian International Development Agency, and others as appropriate.

The planning meeting would take place over a three-day meeting held at a convenient central location within the subregion, and perhaps consist of an initial plenary session and then

smaller break-out working groups to tackle particular issues and develop concrete proposals for action. Final decisions would then be voted and approved by the core group, and a new coherent Network plan adopted.

In terms of the timeframe, it is important to move this process along as quickly as possible, and thus every attempt should be made to organize this planning meeting within three months of the distribution of the final report of the present evaluation (on or about November 30, 2004). That would mean holding the meeting no later than March 2005, if feasible. The facilitators would prepare a report of the meeting, which would include their own comments and advice, and submit it to CORAF, WARP, the DGs, and other partners within two weeks of the meeting's conclusion. Therefore, by April 1, 2005, WARP would have a document from the Networks on which they (WARP) could begin their review and approval process, with the aim that a long-term funding commitment would be authorized and established beginning on October 1, 2005 (the start-date for USAID's fiscal year 2006).

APPENDIX A: SUMMARY ANALYSIS OF THE RICE NETWORK: ROCARIZ—WEST AND CENTRAL AFRICA RICE RESEARCH NETWORK

THE IMPORTANCE OF RICE WITHIN SUBREGION

West Africa is one of the global centers of rice genetic diversity. Rice has been cultivated for centuries, and in countries such as Sierra Leone, Guinea, and Côte d'Ivoire it is the principle staple. Over the past 40 years, rice has shown the fastest rates of growth in Africa of all major food crops in terms of both consumption and production. Between 1962 and 1992, total rice demand grew by an average of 5.6% annually, or double the rate of population growth. Increasing urbanization and associated lifestyle changes have fuelled the growing demand, although rice is no longer a luxury food. The poorest urban households in WCA obtain the largest share of their cereal-based calories from rice.

To meet the growing demand, WCA has had to increasingly rely on imports. Rice imports have risen at a rate of 8% annually since 1961. Approximately 4 million metric tons (MT) are now imported into WCA each year at an annual cost of over US \$1 billion, or 25% of the total value of all imports. According to USDA/FAS statistics, Nigeria alone imported 1.8 million MT of rice in 2002. Given the high levels of poverty and the vast potential for rice cultivation in the subregion, this outflow of capital should be a major concern to policy-makers.

MAJOR REGIONAL CONSTRAINTS TO INCREASED PRODUCTION

WARDA's new long-term strategic plan outlines many of the major constraints to increasing rice production (WARDA, 2004). In addition to the principal biotic and abiotic stresses, other factors play equal and, at times, more significant roles in limiting production. These include weak or nonexistent input supply channels, lack of credit availability, and transportation problems. For the Sahel, more efficient water use and management is key. In total, WCA has only a fraction of the density of basic infrastructure (roads, water control structures, etc.) as did Asia at the time of the Green Revolution.

For most of the coastal states, the dumping of inexpensive "dirty and broken" rice from Asian has killed off competition from local producers. Rice production infrastructure in such fertile areas as the Senegal River Valley is threatened. Already the majority of private mills have closed, and those that remain will soon follow because of the inability to compete with cheap imports, while farmers move their production over the boarder to Mauritania where prices are more favorable through governmental protection. In the forested areas, there is concern over environmental damage due to expanding rice cultivation. Reportedly two thirds of the increase in rice production is achieved through the reduction of fallow lands and expansion into protected or increasingly marginal areas. Combined, the potential gains and significant, multifaceted challenges present a compelling argument for increased investments in boosting WCA rice productivity.

HISTORICAL BACKGROUND OF THE NETWORK

In its current form, ROCARIZ is the newest of the four Networks, formally launched in April 2000 at the first biennial Regional Rice Research Review (4Rs) meeting held at WARDA's headquarters in M'Bé, Côte d'Ivoire. ROCARIZ is the result of a fusion of CORAF's Rice Network and the WARDA task forces mandated in 1998 by the CORAF general assembly and WARDA's National Experts Committee (the two bodies are composed of the NARS DGs from within the subregion). Preceding the launching of ROCARIZ, WARDA convened a broadly participatory stakeholder meeting (NARES, WARDA, WECARD/CORAF, NGOs, farmers groups, rice private sector, universities, USAID) to elaborate a five-year strategic plan for the Network in Yamoussoukro, Côte d'Ivoire (March 1999). The interim steering committee was established during this meeting and later drafted statutory instruments and the management arrangements of the Network that were adopted during the first 4Rs meeting in 2000.

The core of ROCARIZ activities continues to be structured around the original WARDA task forces, the first of which was established in 1991. The number of task forces grew to a total of nine by 1995, before being reduced to six, and then a new technology transfer task force was subsequently added. Each task force targeted a different major constraint or environment. Between 1991 and 1997, task force membership grew to include over 80 NARS scientists drawn from the 17 WARDA member countries. Rationalized around issues of improved coordination, access to information, accelerated technology transfer, and regional rice-sector capacity building, the task forces emerged from and came to embody a vision of positive IARC-NARS relationships quite unlike any other in the subregion, and continue to be referred to as a positive example in this regards (e.g., Eicher and Rukuni, 2003).

ROCARIZ has maintained a task force mode of operation, while adding a full-time coordinator, formal steering committee and broad stakeholder's group, all features of the CORAF Rice Network. The marriage of the two entities, while quite successful in comparison to the struggles encountered in attempting to merge the ROCARS and ROCAFREMI Networks, and the WECAMAN and the CORAF Maize Networks, has drawn mixed reviews from NARS scientists interviewed. Some enjoy the larger atmosphere of the 4Rs meetings, while others expressed concern that these have become a distraction and have served to shift attention away from the research focus of the task forces.

PURPOSE, OBJECTIVES, AND MAJOR PROGRAM COMPONENTS/ACTIVITIES

The stated purpose of the Network is to "...continue the strengthening of NARES' capacity and capability for participatory rice research planning, technology generation, evaluation, and transfer to end-users" (WARDA, 1999). Set against the overall goal of eradicating poverty and malnutrition in the subregion, ROCARIZ has the following four primary objectives:

1. Increasing rice genetic diversity in the region.
2. Increasing rice productivity and production in the region while conserving natural resources.
3. Making the tools, techniques, and mechanisms available to NARES to strengthen R&D capacity and to transfer technologies.

4. Partnership development for an effective participatory technology transfer and market development.

To achieve these objectives, ROCARIZ (1) links together rice stakeholders in WCA to generate technologies and to facilitate their transfer and diffusion to end-users and (2) continues strengthening NARES capacities for participatory rice research planning, technology generation, evaluation, and transfer.

ORGANIZATIONAL STRUCTURE

ROCARIZ operates under an organizational structure similar to the other Networks. The principal management entities are the *general assembly* and *steering committee*. The Network's general assembly, or stakeholders, is convened during the biennial 4Rs meeting. The executive management body of the Network is the steering committee, which meets annually and comprises nine members: seven NARS task force representatives and two WARDA scientists. The steering committee is presided over by a chairman elected from among the NARS. Additional, non-voting steering committee observers can include CORAF, WARDA's Director of Research, WARDA scientists facilitating the different task forces, donors, and other interest groups. Decisions taken by the steering committee are reported to WARDA management, who in turn reports to the WARDA National Experts Committee (composed of NARS leaders), which meets every two years.

On the basis of the conditions drawn up by the steering committee, a Network coordinator is selected from among the member NARS. The coordinator is based at WARDA for a two-year term, renewable once, and is subject to WARDA's policies. The coordinator serves as the secretary to the steering committee, and is responsible for the day-to-day implementation of all the Network's activities.

Functionally, the Network operates under what WARDA refers to as the task force mode. Designed to address major constraints, each task force focuses on a particular problem and/or ecology. Currently, the seven task forces include rice breeding, mangrove swamp rice breeding, natural resource management, Sahel natural resource management, integrated pest management, technology transfer, and rice economics. The separation of mangrove swamp rice and Sahel natural resource management reflect a historical legacy, and could be combined with the rice breeding and natural resource management taskforce, respectively.

Membership in any task force is open, requiring only that the constraint being addressed is present in the country and that there is at least one scientist working on the problem. Scientists are nominated for participation by their NARS directors. The task forces are managed by an internal steering committee, chaired by a NARS scientist, with WARDA scientist(s) serving as secretary and facilitator. Network facilitation is one of mandated duties of each IRS scientist, who allocates a minimum of 10% time annually to ROCARIZ activities.

As with the other Networks, there is a National ROCARIZ Network coordinator at the country level. These coordinators are charged with monitoring all Network activities within the country, in addition to carrying out their own research. Recently, the Network began setting

aside 5% from all research grants to provide the national coordinators with funds to conduct their needed site visits. Scientists in some countries resent the implementation of what is perceived as a tax, while others reportedly see the utility and have voluntarily offered additional sums.

BUDGET

Over the past 10 years USAID funding for the ROCARIZ Network has continued to fall (see Table A1), a decline even more pronounced when viewed from the perspective of constant dollars. By 2001 the Network was receiving much less than half of what the task forces had received six years earlier. This same period corresponds to the first full year under the current ROCARIZ Network configuration with an expanded membership, both in terms of countries (CORAF represents 21 WCA countries, while WARDA at that time covered only 17) and diversity of participants, as well as greater expenses (e.g., salary of the full-time Network coordinator). Prior to the creation of ROCARIZ, all task force coordination had been carried out by WARDA scientists and staff as part of their regular duties. Given these trends, the Team is impressed with and commends WARDA for its show of commitment in using its own resources and continuing to seek additional sources of financing to maintain Network functioning. In fact, without WARDA's ability to attract additional sources of financing, it is likely that ROCARIZ would have a greatly diminished presence. In 2002, assisted through a grant from the EU, ROCARIZ distributed US \$390,000 in small research grants to 98 scientists from 17 countries, an amount nearly 70% greater than the total received that year from USAID. Greater reliance on grants with short duration, or limiting conditionalities, makes inter-annual planning and the pursuit of strategic objectives extremely difficult. Given CORAF's joint sponsorship of ROCARIZ, the Team believes that it is appropriate for CORAF to play a greater role in procuring the financial resource necessary to support one of its Networks.

Table A1. USAID Financing of the Task Forces and ROCARIZ (1995–2003)

Year	USAID Financing (Constant 1995 US dollars)
1995	459,016 (459,016)
1996	473,186 (459,463)
1997	330,071 (313,567)
1998	356,670 (333,486)
1999	194,409 (177,495)
2000	280,130 (247,915)
2001	195,918 (168,685) [74,978 EU]
2002	232,374 (196,820) [440,676 EU]
2003	
2004	160,000 (134,240)

(Source: WARDA Annual Reports 1995–2002–2003)

PROGRESS SINCE THE 1996 EVALUATION

Although not specified as a recommendation in the 1996 evaluation, without a doubt the most important change in Network operations during the period since then has been the merger of

the WARDA task forces and the CORAF Rice Network, resulting in the formation of ROCARIZ. This transformation marked the implementation of a number of additional changes that were recommended by the last evaluation. While the logic supporting the merger was clear, there were significant risks involved, especially for WARDA, which had invested much in building and using the task force mechanism as a means of carrying out its R&D mandate within the subregion. By comparison, the CORAF Rice Network risked little and gained much by becoming fused with a dynamic collaborative research and capacity-building program. The successful design, launching, and implementation of ROCARIZ stands as an important model for recommendations on immediate and future needs for Network consolidation contained in this report.

Overall, the Team believes that significant progress has been made in addressing the general and specific recommendations made in the 1996 report. General recommendations to all the Networks included (1) drafting five-year strategic plans, (2) developing efficient technology transfer models, (3) making investments and institutionalizing the use of e-mail, (4) conducting financial audits of the Network accounts, and (5) expanding participation to include stakeholders beyond the NARS and IARC research community. Specific recommendations directed toward the WARDA task forces and USAID's support included (1) reducing the number of task forces and meetings, (2) the provision (by USAID) of additional funds to support grants linking research and processors, (3) producing outreach material and policy constraints analysis, (4) conducting research impact assessments, (5) developing a strategic plan, and (6) allocating funds for developing impact monitoring capacity. It is not clear to what extent USAID ever provided any additional resources to specifically target these issues. Furthermore, the purposeful integration of task force and core WARDA activities makes disaggregating nearly impossible. Nevertheless, the record of WARDA/Network activities responding to issues raised in the evaluation is significant and includes:

- Convening of a regional stakeholder's meeting (1999) to identify regional rice development priorities (the meeting was attended by representative from NARS, WARDA, farmer organizations, private companies, universities, and other development programs).
- Drafting of a five-year strategic plan for ROCARIZ (WARDA, 1999), based on output from the stakeholder meeting.
- A reduction in the number of task forces from nine to six, and the addition of a new technology transfer task force.
- Improved technology transfer methods developed by WARDA—PVS, CBSS, and PLAR—promoted through the Network and overlapping regional efforts (e.g., participatory research and gender analysis training).
- WARDA's implementation of an e-mail connectivity project supported through USAID's AfricaLink program (implementation of a second phase was carried out by IITA).
- Training in policy analysis (policy analysis matrix) and impact assessment methodologies through the economics task force.
- Various impact and constraints assessments carried out by WARDA economists in collaboration with national partners.
- Extensive audits carried out by WARDA as part of external inquiries led by the World Bank.

The area receiving least attention appears to be that of developing a continual impact monitoring capacity within the Network. There is some question, however, given current funding levels and the lack of resources available within the NARS, whether much progress can be made. Basic numbers, for example, on varieties exchanged and quantities of seeds produced are part of current task force reporting. True assessments on levels of actual farmer adoption and yield and/or income impacts, however, are much more complex, time consuming, and expensive to acquire. Without specific funds targeted to support this activity, the Network is not in a position to make much progress in this area other than laying out generic protocols and offering training in methodologies, which it has done.

MAJOR AREAS OF NETWORK ACTIVITY

As suggested by the stated Network objectives, major areas of activity are varietal diffusion, collaborative task force research activities, training for scientists and technicians, monitoring tours, and the biennial 4Rs Network meetings supporting information exchange. Although patchy, in terms of consolidated documentation, a number of observations can be made concerning the specific areas of Network activity. An exhaustive summary of all WARDA task force activities between 1991 and 1997 was completed in 2001 (Yobouet and Fakorede, 2001). More recently, the Network reports the funding in various locations of 78 projects in 2000, 67 in 2001, 96 projects in 2002, and 70 projects in 2003.¹

Monitoring tours were conducted in Ghana, Togo, Benin, Senegal, and Mauritania in 2001, involving 20 scientists from multiple disciplines. In 2002, a monitoring tour was held in three rice ecologies in Guinea involving 10 researchers, and in 2003, 27 scientists participated in monitoring tours to Sierra Leone, Gambia, and Nigeria.

The first and second 4Rs meetings were held in 2000 and 2002, respectively. The second meeting was attended by over 150 individuals, where 73 papers on ROCARIZ research activities were presented. Attendance at the third 4Rs meeting, held in Accra in 2004 in conjunction with the UN International Year of Rice celebration, was reportedly even more heavily attended. The sandwiching of task force meetings around “Year of Rice” celebration events is likely to draw further criticism from those who have already complained about the shifting emphasis within 4Rs meetings from that of research exchanges to plenary presentations.

ROCARIZ cites plans to provide thematic-based training opportunities in alternate years. Most recently, 10 participants from nine countries completed a course on *impact assessment methodologies* and accompanying SPSS data analysis instruction. Two other trainees completed a six-week internship on anther culture and molecular biology. ROCARIZ in collaboration with CTA and the Inland Valley Consortium, hosted by WARDA, co-financed a workshop on iron toxicity in Cotonou attended by 19 scientists from WCA and Europe.

¹ The 2003/2004 annual report of the *Strengthening National Agricultural Research Systems in Africa through Collaborative Research Networks* (LAG-4111-G-00-3042-00 reviews highlights from the 2003 grants.

PROPOSED FUTURE VISION AND DIRECTION (ORIENTATIONS)

One of the mantras within the development community over the past 10 years has been for the continual broadening in participation of different stakeholder groups. In addition to NARS, IARC, and farmer representation, encouragement has been given to include NGOs, various private sector interests, producer unions, national universities, and other bilateral and international projects and programs. A consequence of this expansion has been a growing diversity of oversight and implementation bodies and a ballooning of Network membership, further fueled in the case of ROCARIZ by the addition of new countries. What had once been an intensive science-based annual meeting has increasingly taken on the flavor and formalities of a subregional conference, with a resulting loss of intimacy and functionality. As a result, efforts are underway by some WARDA scientists to start new *working groups* structured around task force topics, yet which reside outside of the ROCARIZ forum, in an attempt to rekindle the type of close relations that made the original WARDA task forces such productive and enriching associations.

As ROCARIZ begins to position itself for the future, serious attention needs to be directed toward resolving this dilemma of expanding Network inclusiveness, while at the same time guarding against inundating its working groups with additional members to point where they lose functionality. Failure to do so may result in the most productive scientists dropping out, in order to pursue other opportunities that attracted them to the Network in the first place. One option would be to shift, as much as possible, the focus of broad-based participation back to the national level (e.g., national rice research reviews) and reserve the biennial meetings for the central research collaborators (regardless of their organizational affiliation). The extent to which the Network could contribute to national meetings would need to be addressed; however, the advantage of this option is that it would place together national entities that have both operational interests and scope to engage in substantive collaboration. This is not something very feasible for regional meetings attended by a broad (number of countries) and diverse (types of organizations) set of interest groups.

This approach of establishing national Networks was initially planned as the model for the technology transfer task force, but was never implemented. The potential, however, of linking task force activities to a more dynamic and engaged federation of actors at the national level would represent a major step forward in broadening Network impact. An alternative but less attractive option from a cost and time management standpoint would be to hold smaller science-based task force meetings in years between 4Rs meetings. Essentially, this would mean moving back to the structure of the annual task force meetings, which were abandoned due to financial and time constraints. Unless there were major changes in Network funding, the Team does not see this as a feasible option, despite its desirability from a research point of view.

Table A2 shows the provisional five-year budget for the regional rice R&D Network.

Table A2. Regional Rice R&D Network Provisional Five-Year Budget (000 US\$) (Source: WARDA, 1999)

Activities/Items	1999		2000		2001		2002		2003		Total	
	USAID	WARDA	USAID	EU	USAID	EU	USAID	EU	USAID	WARDA	USAID	EU/ WARD A
Task Force meetings ^a	100		110		0		150		0		370	
Visiting Fellows ^b		27		25		26		26		30		139
Monitoring Tours ^c		35		20		15		0		34		101
Research Grants ^d	150		120	110	115		170	110	175		820	
WARDA Scientists ^e		30		15						30		120
Personnel ^f		50	50		50			53	56			259
Scientists' Travel ^g		32		35		20		20		32		160
Support to RRS ^h	30				30		30		30		150	
Communication & Shipping ⁱ		20		8				8		20		100
Seed multiplication		15		20		30		20		15		75
Publications ^j		21		25		30		30		10		88
Overhead	42		46	60.75	29	30.25	52	66.75	31		200	
Total	322	230	356	303.75	224	151.25	402	333.75	292	171	1540	1189.75

a) To support 1 Annual Task Force Plenary and Steering Committee meeting (1999) and 2 biennial Regional Rice Reviews (2000 and 2002) for 95 participants based on an average of 3 travel days and 3 meeting days (\$300); and \$700 travel costs per participant. Interpretation (\$4000); stationary and photocopying (\$700); refreshments (\$300).

b) To support 18 visiting fellows at an average duration of 30 days per fellowship; (\$30) per diem; (\$600) travel costs per visiting fellow

c) To support 4 monitoring tours for about 10 participants at a cost of (\$750) per participant

d) USAID funding will support about 90 small grant projects at an average cost of \$1700

e) Value of time of WARDA scientists (7 TF Coordinators + PL4) = \$30000

f) 1 Research Assistant/Program Support Officer (\$25000); 1 Liaison Scientist (\$13000); 1 Secretary (\$12000)

g) WARDA scientists visit TF activities funded through small grants

h) \$15000 consumables (chemicals, etc.) and equipment; \$10000; \$5000 fuel in support to RRS hybridization work

i) Telex, post and telephone charges \$12000; \$8000 shipping charges for dispatch of seeds to Guinea Bissau, Gambia and Senegal

j) Task Force meetings proceedings; TF research reports: production and circulation of TF Newsletter

NB: Value of National Scientists' time and use of equipment and facilities not included. Estimates are based on 1998 actual costs

APPENDIX B: SUMMARY ANALYSIS OF THE MAIZE NETWORK: WECAMAN—WEST AND CENTRAL AFRICA MAIZE COLLABORATIVE RESEARCH NETWORK

THE IMPORTANCE OF MAIZE WITHIN THE SUBREGION

The expansion of maize production in the WCA over the past two to three decades has been nothing short of phenomenal. Between 1980 and 2000, total maize production increased from less than 3 million MT to more than 10 million, nearly a fourfold increase (Fakorede et al., 2003). Most of this increase has been due to the increased area under cultivation, and only slightly because of higher yields. Nigeria, as an example, increased its area harvested by more than 2.5 million ha during the 1990s and increased maize grain production from 1.8 million to 5.4 million MT from the early to the late 1990s. Ghana's production rose from 683 to 1,015 million MT during the same period. Most of the countries of the subregion experienced similar increases with the exception of Chad and Senegal, perhaps due to the worsening rainfall patterns and their more drought-prone climates.

Much of the expansion in maize production has occurred northward in the subregion, into the Soudanian zones, which are drier but have fewer serious disease and insect problems. The availability of early (90–95 day) and extra-early (80–85 day) varieties, developed and disseminated in large part through WECAMAN, has made this expansion possible. Maize has replaced sorghum, and sometimes even millet, in many of these areas. The wide acceptance of maize by producers is due in large part to its versatility, providing a food source (roasting ears) early during the “hungry” period (when even new crop sorghum and millet are not yet available) as well as dry grain for making flour for traditional foods the rest of the year. Demand is also growing for maize for industrial uses (processed foods, livestock feed, malting for beer).

MAJOR REGIONAL CONSTRAINTS TO INCREASED PRODUCTION

The most important constraints to maize production in the WCA as identified by WECAMAN are drought, low soil fertility, *Striga*, stems borers, and maize streak virus. The latter two are more important in the more humid southern zones of the subregion. There are of course many lesser constraints on which research is being conducted by the NARS throughout the region, but those cited above are deemed the most critical from a regional standpoint by Network scientists. Farmers also face a variety of policy and institutional constraints as well, such as undeveloped markets, high cost or unavailability of inputs, labor needs (especially for weeding), and difficult access to credit—all of which inhibit increases in maize yields and production.

HISTORICAL BACKGROUND OF NETWORK

WECAMAN was formally established in 1987 by a group of WCA maize scientists as one of four Networks that evolved from the SAFGRAD Phase II project funded by USAID. The purpose was to “pool their human, infrastructural, material, and financial resources to tackle production problems common to countries in the subregion through the development and transfer of appropriate technologies” (Badu-Apraku, 2004). WECAMAN became autonomous in 1993

and, as a result of several favorable assessments, was funded again by USAID for two subsequent periods totaling five years (fiscal years 94–95 and 96–98). Following the 1996 evaluation, USAID approved funding for the five-year strategic plan prepared by WECAMAN covering the period from October 1998 to September 2003. Since then, the Network has been operating under *bridging* funds during a transition period pending the results of the current review and future funding decisions made by WARP.

At the outset, all 17 WCA countries were members of WECAMAN, but owing to funding cuts this number was reduced to 8 in 1993 (Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Ghana, Mali, Nigeria, Togo). However, recently Chad, Guinea, and Senegal rejoined, bringing the total up to 11 countries. The Network's approach from the outset was to honestly appraise the research capabilities of each member country and classify them as either technology developers (and thus lead centers) or as technology adapters, each then assigned different roles and responsibilities within the Network.

PURPOSE, OBJECTIVES, AND MAJOR PROGRAM COMPONENTS/ACTIVITIES

The **overall objective** of WECAMAN, as stated in its five-year strategic plan for 1998–2003, is to “increase maize productivity, production, and income of farmers through the use of appropriate technologies identified by the Network and extended to farmers by extension services and NGOs in the respective member countries.” The **specific objectives** are to:

1. Develop maize varieties that possess resistance/tolerance to the major biotic and abiotic stresses that limit maize production in the subregion.
2. Develop suitable agronomic practices to enhance increased productivity and production.
3. Develop sustainable seed production and distribution systems in the subregion.
4. Develop and promote alternative uses of maize.
5. Enhance the capacity within the Network to carry out collaborative research program with minimum outside support.
6. Promote the adoption of improved maize varieties and crop management practices.

The major program components or activities established by WECAMAN to achieve these objectives are as follows:

1. Collaborative research projects
2. Regionally oriented resident research (conducted by the Network coordinator)
3. Regional trials
4. Exchange of scientific information and technologies
5. Human resources development
6. Impact assessment.

ORGANIZATIONAL STRUCTURE

General Assembly (GA): Composed of the steering committee/national WECAMAN coordinators plus representatives of the NARS (directors of research), CORAF, OAU/STRC, SAFGRAD, IITA, and donors; meets every two years.

Steering Committee (SC): Composed of eight NARS scientists plus the Network coordinator who are to meet twice per year and serve for two-year renewable terms; officers elected by their peers; approves the annual work plans and budgets; appoints the research committee (see below); evaluates annual progress; establishes the criteria for the research fund allocations; and monitors implementation of Network activities.

Ad-hoc Research Committee (ARC): Composed of three agricultural research scientists from nonmember countries (one each from IITA's maize program, SAFGRAD, and CORAF) appointed by the SC for two-year terms; assesses progress reports from research projects; reviews research proposal, allocates research funds based on SC criteria; and selects lead centers for specific projects; all decisions approved by the SC.

Executing Agency: Role served by IITA since the outset; recruits and hires the Network coordinator; provides technical backstopping from its large core of scientists; provides the critical administrative and communication facilities; disburses the funds to the NARS for Network-supported research and related activities; funds the resident research of the NC from its core funds; participates in the ARC, Network meetings, monitoring tours, and consultation visits; provides training assistance, facilities, and sometimes even funding for attendance by Network technicians and scientists; helps review and edit research publications.

Network Coordinator (NC): Manages day-to-day operations of the Network; carries out the decisions of the SC; prepares and arranges all network meetings, tours and visits; prepares annual work plans and budgets for review and approval by SC; writes all progress reports to the donors; writes, edits and supports Network publications. The current NC is Dr. Baffour Badu-Apraku, a Ghanaian plant breeder, who has served for many years in the position, based for most of this period in Cote d'Ivoire at WARDA, where he has used national (CNRA) facilities at Ferkessedougou for research work on breeding early and extra-early maturing maize varieties. Owing to the civil disorder in Cote d'Ivoire, Dr. Badu-Apraku moved recently to a temporary base at IITA in Ibadan. The time allocation for the NC across his various responsibilities is roughly as follows:

- 25–30% Plant breeding (research)
- 10–15% Germplasm conservation and maintenance, seed increases for Network trials and for further seed multiplication and diffusion by NARS scientists (nonresearch).
- 30% Administrative responsibilities such as organizing/arranging meetings and workshops, overseeing fund disbursements, other Network logistics, and the like.
- 30% Scientific coordination and backstopping: consultation visits, monitoring tours, publications, conference proceedings, grant proposal reviews, scientific communications with Network colleagues, and the like.

The NC's research program was determined and requested by the SC, but has been paid in part by IITA in the past. If this kind of research is still warranted, which it seems to be, it should continue where it can be done properly and well (not necessarily only at IITA or an IARC). The time spent on germplasm and seed increases could be transferred to a NARS program willing to take on this task; however, it has to be done right and on time, as it directly affects the regional research program. And timely shipment of seed for the Network's regional trials and other activities is imperative.

Country Coordinators (CC): Serve as the point of first contact with the Networks in their respective countries, provide encouragement and oversight for Network activities, facilitate preparation of research proposals submitted to WECAMAN and research progress reports, compile annual Network activity reports, and serve as the liaison between the NC and the participating NARS scientists. The Team met with many CCs during its travels through the region in July–August 2004. Many have active programs supported by the Networks. Most are given few if any resources to actually accomplish their job of communicating with Network scientists and monitoring Network activities.

Partners: WECAMAN views its key partners as the NARES, SAFGRAD, INSAH, SG 2000, Sahel Solidarité, and Premier Seed of Nigeria. The clients who are also considered as partners include “small, medium and large-scale farmers and other actors in the national economies.”

WECAMAN documents state that the Network operates under “the umbrella of CORAF” but doesn't provide any details as to the specific role or participation of CORAF, other than its membership as indicated above in the General Assembly and the Research Committee.

BUDGET

The budget proposed to USAID for the 1998–2003 period (ending September 2003, in accordance with USAID's fiscal year) was \$400,000 per year, but as shown in Table B1, the actual amount was about \$300,000 per year on average for the final three years of the grant.

Table B1. Proposed WECAMAN Budget for 1998–2003

CATEGORY	October 2000— September 2001	October 2001— September 2002	October 2002— September 2003	TOTAL FY 2001–2003
Coordination	\$122,244	\$145,496	\$135,528	\$403,268
Planning/Evaluation	6,656	7,126	6,011	19,793
Research Collaboration	75,524	105,344	66,786	247,654
Training/Institution Strengthening	46,981	22,783	17,665	87,429
Administrative Support (Overhead)	47,264	52,781	42,486	142,531
TOTAL	\$298,669	\$333,530	\$268,476	\$900,675

The following explains the particular kinds of activities covered under these line items:

- *Coordination:* This line item (roughly 45% of the total costs) includes the salary and benefits of the WECAMAN coordinator, administrative and field support staff, communications

costs (e-mails, telephone, fax), cost of dispatching the regional trials and seed to the WECAMAN collaborators in member countries, cost of consultation visits by the coordinator and selected members of the SC, and cost of network publications. Note that IITA covered part of the resident research costs of the coordinator from 1994 to 2001 (\$20,000–\$25,000 per year), but stopped in 2002.

- *Planning and Evaluation:* This includes impact assessment studies, SC meetings, strategic planning workshops and consultancies.
- *Research Collaboration:* This line item (roughly 27% of the total costs) covers funds released to the NARS for collaborative research projects funded by the Network.
- *Training/Institution Strengthening:* This line item was used to fund the regional maize workshops, training workshops, special purpose seminars, and monitoring tours.
- *Administrative Support:* This represents the overhead of IITA for backstopping, provision of administrative support (office facilities, electricity for offices), and financial management. This was charged as a flat rate of 18.8% of the other costs and amounted to about \$47,000/year.

For the transition year of fiscal year 2004 (October 2003–September 2004), WECAMAN's budget amounted to a total of \$260,000. This came from two sources within USAID. USAID agreed to provide \$160,000 as *bridging* funds for fiscal year 2004 (IITA's original proposal requested \$125,000, but WARP increased that by \$35,000 to the final amount of \$160,000.) In addition, USAID also agreed to allow IITA to use the approximately \$100,000 in funds remaining from the previous five-year grant for a no-cost extension for WECAMAN activities during fiscal year 2004. The written proposals of both the *no-cost extension* and the *bridging funds* are very similar and complementary, as one would expect, and both also use an overhead rate of 22.8%.

Starting in 1998, UNDP/IFAD has provided funding to WECAMAN through the African Maize Stress (AMS) project. For the period 1998–2001, this amounted to \$400,000 per year. In addition, since 2003, the Nippon foundation has been providing \$80,000 per year to the Network to support quality protein maize development and dissemination over a four-year period. Identifying and securing funds from a variety of sources is important to the sustainability of WECAMAN, and has allowed the Network to accomplish even more than the core budget would otherwise allow.

RESULTS AND ACCOMPLISHMENTS SINCE 1996

The Team has been provided an extensive set of documents by the NC and many of the country (national) coordinators. This includes annual reports as well as two strategic plans (1998–2003 and 2004–2009), a synthesis report for 1997–2003, several recent edited proceedings, and several journal articles. These provide detailed information on research trials and results, varieties tested and released, and training programs, monitoring tours, and consultation visits completed. The commentary below provides some selective highlights.

As for WECAMAN's research record, as indicated earlier, a large number of early and extra-early maize varieties have been bred and widely tested by the Network, a number have been released by individual countries, and a number have found their way into farmers' fields. One

recent study (Manyong et al., 2003) found that new maize varieties are now grown on 37% of maize fields in the WCA. Given the cross-pollinated nature of maize and the natural movement of pollen in the air, the genetic line between improved and local varieties must be blurring. According to knowledgeable observers, what some farmers call “local” varieties may in fact be or derive from “improved” varieties. As a result, it is possible that Manyong’s figure may be low.

It is also important to note that, to improve the research for new maize varieties tolerant of the major stresses, WECAMAN has supported the creation of six regional stress screening sites (two each for drought, low-N, and *Striga*—all in different countries). This has been an important contribution to upgrading the capacity of the NARS to do critical research, with regional impact. Results thus far are encouraging, especially for *Striga* tolerance. Selected lines and varieties have gone into uniform regional trials, and some have even been released and put into on-farm testing and seed increase programs. The Network also has initiated programs on quality protein maize in collaboration with SG 2000 and other organizations, a program that is beginning to provide good yielding and agronomically adapted maize varieties that are nutritionally superior to traditional varieties (higher levels of lysine and tryptophan).

Increase in yields due to improved soil fertility seems to be gaining ground in the region, with help from the carry-over effects of fertilizers used in cotton zones and greater use of maize-legume associations and rotations to take best advantage of biological Nitrogen fixation. These fertility enhancements are also helping reduce losses due to *Striga*, coupled with more *Striga*-tolerant varieties.

In terms of human resource development and capacity building, WECAMAN has organized and supported a large number of training programs over the years. Eight 1–2 weeks short courses have been held for some 96 research scientists on such topics as breeding for *Striga* tolerance, advanced statistical computing, and biotechnology. For many years (up to 2001), WECAMAN also conducted a comprehensive maize research training course every year lasting five months (records show that 52 technicians for WCA attended these courses). Interviews with NARS scientists revealed that training and professional development was one of the most valuable contributions of the Network. NARS scientists often told the Team that the technician training program vastly improved the quality of the research methods used and data produced by the technicians and freed up scientists from much of the time-consuming oversight.

WECAMAN has also organized monitoring tours (the last two were in 1998 and 2000) that have allowed participating scientists to observe and evaluate each other’s research programs and to exchange valuable information and ideas. In addition, during the alternating years from the monitoring tours, WECAMAN has organized regional maize workshops (the last one in May 2001 in Benin) in which participating scientists presented papers on their results, shared information with colleagues from other countries, and built collaborative relationships. These events have helped push scientists to write up their research for publication and peer review, and served not only to exchange knowledge and experiences but also improve the quality of the research designed and conducted.

ASSESSMENT OF NETWORK EFFECTIVENESS, PERFORMANCE, AND OUTCOMES

The record of this Network over the past five years and, indeed since its beginning, is indeed impressive. This is exemplified by the number of research technicians trained resulting in greatly improved trial management and data quality; the number of research scientists whose skills have been upgraded; the number of scientific papers presented at regional workshops and later published (with improved quality over time, peer-reviewed before appearing in the Proceedings); the number of NARS scientists (over 100 by some estimates) in the region actively participating in the Network (funded research, training, monitoring tours, regional professional workshops); the number of improved varieties tested regionally; the number of varieties released by member countries; and the number of new varieties and crop management technologies placed in on-farm tests and adopted by farmers.

Though the amounts granted by the Network to individual research groups of NARS scientists (mostly interdisciplinary teams, seldom individuals) are relatively small (typically \$1,500–\$3,000), these have made a tremendous difference to NARS scientists and national research programs and have made research possible where in some cases it would not have been done. The Team found universal appreciation of this contribution to Network and NARS research, even if the relatively small size of the grants was lamented by some (inadequate funding by the NARS themselves was lamented far more, however). These grants provided the critical margin of difference, and the NARS scientists and leadership understand and appreciate this contribution from USAID through the Network.

Although there has been a significant fall-off in activities and therefore results over the past two years, due mainly to the conflict in Cote d'Ivoire where the NC was based and to sharply reduced funding, the fact is that WECAMAN has continued a strong consistent record of accomplishments, has begun moving away from almost exclusive emphasis on research toward more development and technology transfer activities, has preformed effectively, and is by and large well-regarded by participating NARS scientists. All in all, this Network is functioning well and achieving its stated goal and objectives. And, much to its credit, it has shown its ability to change its objectives, strategies, research projects, and other programs according to changing needs and circumstances. WECAMAN has clearly evolved over time, and in directions that the Team finds not only appropriate but necessary.

Less well known and much more difficult to quantify and document is the real socioeconomic impact of WECAMAN on the farming systems and the well-being of farm families in the WCA. Assessing impact is well beyond the scope of this evaluation. Some data do exist, however, but mostly related to varieties. As indicated above, they do show significant adoption of these new technologies by farmers. Much to its credit, WECAMAN has funded several impact assessment studies and considers this an important Network program component.

PROPOSED FUTURE VISION AND DIRECTION (ORIENTATIONS)

In May 2003, the Network convened a week-long strategic planning workshop (some 30 NARS scientists and other parties attended), which resulted in a new five-year strategic plan (its second since the 1996 evaluation) covering the period of October 2003–September 2009. The stated

goal of this new plan is to “improve the maize subsector in WCA for increased food security, income generation, and poverty reduction”—certainly clearly articulated, appropriate and consistent with the goals of IEHA. The stated purpose is to “strengthen the capacity and capability of NARS in member countries to develop market-oriented research for maize, and generate and disseminate appropriate maize technologies for end-users.” Though general, this statement seems to reinforce the priority of capacity building for NARS, a stronger emphasis on markets, and equal emphasis perhaps on technology dissemination and technology generation. The changing orientation and focus become a bit clearer when examining the plan’s seven SOs:

1. Advocate the development of appropriate policy reforms for sustained maize production and productivity.
2. Develop market information systems to guide and link maize farmers, traders, end-users, input dealers, and policy makers.
3. Stimulate trade by promoting appropriate agro-enterprise development and strengthening of farmers’ groups.
4. Promote existing and new maize technologies for specific markets, production areas, and utilization.
5. Develop stress-tolerant, micro-nutrient dense and quality protein maize varieties to improve income generating capabilities and nutritional status of farmers.
6. Develop new products and processing methods to diversify utilization of maize.
7. Enhance NARES capacity to develop and transfer technology through training, infrastructure development, use of biotechnology, other new tools, and innovative approaches.

Each of these SOs is viewed as a project, for which grant proposals will be solicited from member countries, with a competitive selection process conducted by the research committee using the customary mechanism. These SOs show a definite move away from the more conventional research agenda and from an emphasis on varietal development (not elimination, which is wise), but rather more towards addressing through research as well as development and promotion the other nontechnical constraints to increased maize productivity and production.

As pointed out by Badu-Apraku (2004), even with the changes made by farmers, yields have only risen a couple hundred kg/ha, and thus wide gaps remain between farmers yields and those obtained in good on-farm demonstration plots (not to mention in well-cared station trials). There remains much room for improvement (one vs. six MT/ha), but the stage does seem set for significant progress in the future, based on the progress made thus far by WECAMAN, and assuming the nontechnical, nonbiological constraints can be removed or resolved by policy-makers and national governments.

APPENDIX C: SUMMARY ANALYSIS OF THE SORGHUM NETWORK: ROCARS— WEST AND CENTRAL AFRICA SORGHUM RESEARCH NETWORK

IMPORTANCE OF SORGHUM WITHIN THE SUBREGION

Sorghum is the main staple food crop in the semi-arid zone of the WCA. It is cultivated mostly under rain-fed conditions with some transplanting (off-season) done in Nigeria, Chad, Niger, and Cameroon. Sorghum production in the WCA was estimated at about 10 million MT in 1994 and is expected to reach about 14 million MT by 2005 (FAO/ICRISAT, 1996). Given an annual population growth rate of 2.9%, there may be a shortfall of some 400,000 MT to meet the expected in 2005. Currently, the total area planted to sorghum is more than 13 million ha.

Sorghum is consumed in many forms such as flat bread, thin or thick, fermented or unfermented porridge and boiled products, cakes fried in oil, and both alcoholic and non-alcoholic beverages. Brewing and malting industries continue to develop in the subregion and are using a substantial portion of the sorghum produced. Use of sorghum as animal feed is not yet widespread; however, sorghum stalks serve as building materials and as sources of energy. Some sorghum processing by-products are being used as animal feed.

MAJOR REGIONAL CONSTRAINTS TO INCREASED PRODUCTION

Sorghum production in the WCA is beset by many biotic, abiotic, socioeconomic, and institutional constraints. Most farmers view sorghum as a multiple use crop (food, feed, and construction material). Unfortunately, there is lack of suitable, adapted varieties that combine high grain yield with one or two desirable characteristics such as straw for livestock and/or stalks for fencing, firewood and building of homestead structures.

Among the most important biotic constraints is *Striga*, a parasitic weed that draws moisture and nutrients from sorghum thereby inhibiting growth and in severe cases causing plant death. Stem borers, head-bugs, and midge are the primary insect pests; shoot fly causes severe losses in late-planted and off-season crops. The most common diseases are anthracnose, downy mildew, ergot, charcoal rot, and leaf blight, and both head bugs and grain moulds can cause significant reduction in both grain quality and quantity during the grain-filling stage. Birds sometimes cause heavy damage prior to harvest.

Insufficient and irregular rainfall distribution increases the risk of production failure due to drought and high day temperatures. WCA soils are characterized by low fertility (especially N and P) and fragility, which keep yields low. Photoperiod sensitivity of traditional varieties is at the origin of their inability to produce high grain yield whenever rainfall ceases early. On the other hand, moulds and poor grain quality arise when grain matures while rains persist.

Sorghum farmers have also faced institutional and socioeconomic constraints. Various government policies over the years have hindered farmers' access to inputs, credit, and even new markets. Because of sorghum's lower returns to investment, WCA farmers often prefer growing rice and maize whenever resources are available, pushing sorghum production to marginal lands. Decreased availability and rising costs of labor (especially for weeding operations) are

also growing problems for sorghum farmers. And poor research-extension-inputs-farmers linkages continue to result in low adoption of improved technologies and constrain production. Another constant is inadequate market development because of the subsistence nature of the crop. Because most grain is traded locally, increases in production could trigger price collapse.

HISTORICAL BACKGROUND OF NETWORK

The first regional sorghum Network was established in 1984 by ICRISAT and the NARS with USAID assistance through SAFGRAD. It became fully operational in 1986 with a five-year program and funding. The mode of operation then consisted of posting ICRISAT scientists in several NARS countries, building the Sahelian Center at Sadore in Niger, and supporting national stations in Mali, Nigeria, and Senegal.

In the 1990s with the decentralization of ICRISAT activities, a regional approach was established and a joint initiative between INSAH and SPAAR was launched to develop a regional Research Pole for CILSS countries. The pole concept was replaced by a Network concept which was more collaborative. Later a regional coordination unit was created and established in ICRISAT with the objective to assist NARS with logistical and technical support.

At a regional workshop held in Mali in March 1995, the sorghum-producing countries of WCA endorsed the decision to expand membership of the Pole and agreed to replace the pole concept with that of a collaborative research network. Consequently, the member countries unanimously created the West and Central Africa Sorghum Research Network (WCARSN, known as ROCARS in French). Since 1989, the Network coordinating unit has been based at the ICRISAT Center at Samanko in Mali.

PURPOSE, OBJECTIVES, AND MAJOR PROGRAM COMPONENTS/ACTIVITIES

The purpose of the Network is to help national sorghum programs to better tackle production and processing constraints that prevail within the WCA subregion. The overall goal is to improve the production, productivity, and use of sorghum, and to contribute to greater food security and socioeconomic well-being of sorghum producers. The specific objectives of ROCARS are to:

- Strengthen linkages among the sorghum researchers in WCA countries for the exchange of plant genetic materials, technologies, and research information.
- Help the Network member countries improve their research and extension services through human resource development.
- Coordinate collaborative research among members of the Network in the areas of germplasm development and natural resource management.
- Facilitate the improvement of sustainable sorghum-based production systems in the WCA.
- Promote cooperation between member countries and national, regional, and international institutions interested in sorghum research and development in the WCA.

To achieve the above mentioned objectives, the Network conducts the following activities:

- Collaborative research projects

- Exchange of scientific information and technologies
- Technology transfer
- Human resources development
- Monitoring tours and impact assessment.

In addition to these activities, strategic work is conducted through:

- Partnership development in variety development, including participatory breeding, seed production and distribution, exchange of promising materials, and on-farm trials.
- Integrated pest management and natural resource management.
- Market-driven development opportunities for sorghum.

The Network acknowledges that the rather limited use of sorghum products has resulted from its poor marketing, the lack of appropriate processing equipment, and the lack of suitable varieties for different end-uses. These constraints need to be better addressed.

Taking into consideration the fact that a number of new technologies had been developed, a new strategic plan for the period 1998–2003 redefined ROCARS' strategic priorities as follows:

- Improve sorghum production and productivity.
- Promote market-driven development opportunities for sorghum (diversification of sorghum use).
- Increase institutional and human resources capacity building.
- Initiate partnership development with relevant stakeholders.

The new initiatives have required ROCARS to emphasize and invest more in providing technical support and facilitating contacts among producers, processors, input suppliers, and the research and extension systems.

Since 2002, because of the scarcity of funds, ROCARS has focused its activities in four main areas:

1. Development of sustainable seed production and distribution of adopted varieties/hybrids—Pilot countries: Burkina Faso, Mali, Niger, Togo, Nigeria, Senegal (sorghum/millet).
2. Development and extension of integrated crop, pest (including *Striga*), and disease management technologies to increase production—Pilot countries: Nigeria, Burkina Faso, Niger, Mali, Ghana, Benin, Cameroon.
3. Market-driven development opportunities for sorghum—Pilot countries: Nigeria, Burkina Faso, Mali, Niger, Senegal, and Togo.
4. Enhancement of communication and technology exchange through information sharing and capacity building.

ROCARS has helped to (1) reinforce the collaboration between NARS and IARCs, (2) share responsibilities in technology development, and (3) avoid duplication of effort at the subregional level. The Network has set-up a permanent dialogue between all scientists who now share information about existing technologies.

ORGANIZATIONAL STRUCTURE

The Network is governed and managed by the general assembly, the SC, the Network coordination unit, and the national coordinators.

The GA is the highest entity of the Network is convened once every two years. However, special meetings can be held if requested by the SC. The GA is responsible for (1) determining the orientation of the research programs; (2) electing members of the SC; (3) approving the location of the secretariat of the Network; (4) confirming the appointment of the NC; (5) evaluating the activities (including financial management) of the SC and the NC; and (6) approving decisions made by the SC.

The GA consists of full members, associate members, and invited participants. All countries in the WCA are eligible as full members of the Network. Member countries are represented in the GA by the NARS directors and the national coordinators of the Network. Each NARS represented at the GA has one vote. A two-thirds majority of the members present is required to pass a decision by the GA.

Subregional, regional, and international institutions; donor agencies; and countries from outside the WCA involved or interested in sorghum research are eligible for associate membership in the Network. Associate members contribute to the strengthening of the Network through their scientific, technical, material, and financial backstopping.

The SC is the management and monitoring body of the Network and meets twice a year. It is responsible for (1) planning, coordinating, and monitoring the activities of the Network; (2) proposing amendments to Network research programs; (3) promoting the implementation and the transfer of technologies developed by the Network; (4) reviewing the work plan, the activities of the NC and the budget; (5) evaluating the performance of the NC; (6) searching for, and monitoring the management of, Network funds; (7) reviewing and selecting research projects submitted and allocating funds; (8) evaluating the implementation of Network research programs/projects; (9) promoting collaboration between the NARS, the Network, and other partners; (10) encouraging and promoting the publication of scientific papers by scientists; (11) ensuring that financial reports are made available to the donors; and (12) approving the recruitment of the NC. The SC consists of seven members representing different disciplines who are elected by the GA for two years and elects its chairperson from within its own ranks.

The Network coordination unit is the executive body of the Network. It comprises the coordinator, an administrative/financial assistant, a secretary, and a driver. The NC is recruited for a period of two years, renewable based on evaluation of performance. The NARS nominate a senior scientist as the country (national) coordinator for in-country coordination of Network activities. The national coordinator is the technical link between the Network coordination unit and the NARS of a country, and between the Network members within the country.

BUDGET

The budget for the period 1998–2003 is shown in the table below. It shows that around 30% of the budget remains at ICRISAT whereas 33% is devoted to countries to run their programs. That

situation is causing problems, and some NARS are asking ICRISAT to support the coordination costs. They argue that since the NARS do not charge their salaries to the Network, they do not believe that ICRISAT should be doing so. Maybe a compromise solution needs to be found either by negotiating separately for the coordination costs or by sharing responsibilities. NARS involvement could be raised up to 50–60%. That means that they should be able to run additional activities such as training courses and seed multiplication on behalf of the subregion. ICRISAT charges an overhead of 22%, but this is on salaries only.

Some NARS directors complain that Networks bring additional work to their centers without any additional funding. They argue that any work has financial implications (administrative backstopping, running costs). Some are bothered by the fact that IARCs receive overheads but not the NARS. Another request heard by the Team is that the Networks' management needs to be audited. Clarification of Network expenditures and IARC overheads by an impartial third party should help reduce some of the misunderstandings, confusion, and even suspicions that now exist within some NARS. This may be an area where CORAF could help.

LINE ITEM	REQUEST TO USAID (US\$)					TOTAL
	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003	
COORDINATION						
. Coordinator	54 000	56 400	59 220	62 181	65 290	297 091
. Support Staff (3)	29 000	30 387	31 907	33 503	35 178	159 975
. Coordination	27 000	43 213	44 873	47 316	42 000	204 402
. Photocopy Machine	10 000	-	-	-	-	10 000
. New Vehicle				49 000		49 000
TOTAL	120 000	130 000	136 000	192 000	142 468	720 468
RESEARCH COLLABORATION						-
. In-Country Research Activities	143 000	150 000	150 000	155 000	155 000	753 000
. Coordinator's Resident Research	7 000	10 000	10 000	10 000	10 000	47 000
TOTAL	150 000	160 000	160 000	165 000	165 000	800 000
PLANNING and EVALUATION						-
. Steering Committee Meeting	20 000	20 000	20 000	20 000	20 000	100 000
. Regional Research Review Workshop	60 000	-	65 000	-	70 000	195 000
. Stakeholders Workshop	10 000	20 000	15 000	25 000	15 000	85 000
. Workshop Proceedings	15 000	-	15 000	-	15 000	45 000
. Coordinator's Regional Travel	10 000	15 000	15 000	15 000	10 000	65 000
. Monitoring Tours	14 000	20 000	20 000	20 000	20 000	94 000
TOTAL	129 000	75 000	150 000	80 000	150 000	584 000
TRAINING/INSTITUTIONAL STRENGTHENING	65 000	70 000	70 000	80 000	60 000	345 000
SUBTOTAL	464 000	435 000	516 000	517 000	517 468	2 449 468
OVERHEAD @ 22% of Salary Costs	18 260	19 093	20 048	21 050	22 103	100 554
GRAND TOTAL	482 260	454 093	536 048	538 050	539 571	2 550 022

RESULTS AND ACCOMPLISHMENTS SINCE THE 1996 EVALUATION

Since the last evaluation, a great deal of progress has been made. Results have been mainly in variety improvement but more recently progress has occurred on processing issues and on marketing aspects.

VARIETIES IDENTIFIED BY COUNTRY FOR LARGE DIFFUSION

- Benin: ICV 111; Blanc de Karimama
- Burkina Faso: Sarioso 10; IRAT 204; ICSV 1049; Framida; Nongomsoba
- Cameroon: Zouaye; CS 54; CS 144
- Chad: IRAT 204; S35
- Gambia: Kosoroka; Sarioso; CEM – 3261; E 35-1; Laeloi; Kollindigo; Chalack; P3 Kolo; Zolo; ICMV – 15; Pakahba; Hassm Nyang
- Ghana: ICSV 111
- Niger: Nad-1 (hybrid); 90 SN7
- Nigeria: ICSV 111, ICSV – 400 and NRL 3
- Mali: N'Ténimissa; Malisor 92-1; CSM 219; Foulatiéba; Sarioso 1; CSM 388
- Togo: Sorvato 1; Sorvato 27; Sorvato 28; Sorvato 41.

Results from on-farm tests of improved varieties revealed that a number of new sorghum varieties were not only technically feasible for production, but socially acceptable and economically profitable.

CULTURAL PRACTICES

Results showed that intercropping of sorghum with spreading cowpea reduced the emergence of *Striga*, and that alternate hill and alternate row arrangements of components were equally effective in controlling *Striga* emergence.

PROCESSING

1. Varieties Samsorg 14 and 17 are showing some interesting potentials for bread. A ratio of 80% wheat flour : 20% sorghum flour was established as optimum for leaven bread in Nigeria and Mali, while 50 : 50 and 20 : 80 were found appropriate for confectioneries. This available technology needs to be extended to end-users.
2. Sorghum varieties SK 5912 and ICSV 400 were identified suitable for malting in Nigeria. Although this finding was obtained before 1995, it is being highlighted to justify the need to promote the diversification of sorghum for malting. It is desirable to intensify research to identify other varieties in the subregion.
3. On the basis of the research conducted to extend the shelf life of “Tchapalo drink” in Côte d’Ivoire, it was found that it could be extended from two days to eight months. It is desirable to improve the flavour of pasteurized “Tchapalo.” Transfer of these technologies to other NARS has been initiated.

4. Parboiled sorghum was identified as comparable to parboiled rice in taste, color, and odor in Mali, and this technology should be transferred to end-users (ROCARS may capture the research expertise and technologies developed and being developed by INTSORMIL).
5. Sorghum variety FARAFAFA was identified suitable for composite flour in Nigeria prior to 1995.

INDUSTRIAL PROCESSING

ROCARS and the millet Network have achieved some promising results on sorghum to used for industrial purposes:

1. Rotative drier and cleaner machines were set-up and validation processes gave good preservation of the products quality.
2. Some adaptability work has been conducted about the use of discs than the resinoid discs on the PRL decorticator: aluminium or steel discs.
3. A wheat thresher was improved for threshing millet and a rice husking equipment Engleberg-Amuda for millet dehulling.
4. Production of a Polycereal Destoner.

Among other experiences gained by ROCARS, it is worth mentioning that:

1. The physical-chemical characterization of flours, semolinas, weaning flours: couscous, snacks (completed) and various tests on long shelf life.
2. The tests on various packaging (humidification level, evolution, and quality).
3. Evaluation of the effect of acid and alkaline treatments on grains, flours and shelf life.
4. Promotion of “sorghum rice,” malted drinks, and cookies from sorghum, among which: Composite flour, Croquette of composite flour, Crunch, SORBIS and other Biscuits.
5. Production of bread from sorghum. Sorghum has an important potential for bakery-“rich bread” highly appreciated by the consumers.

These activities target and will hopefully lead to the creation of new market opportunities for sorghum producers.

CAPACITY BUILDING

ROCARS sponsored a total of nine short-term training courses for scientists and technicians from 1995 to date. Three covered impact assessment whereas one each was conducted on sorghum and pearl millet diseases, agricultural experimentation, an advanced computer course for breeders and agronomists, *Striga* control, sorghum pests, and diversification of use of sorghum. No long-term training in postgraduate studies (MSc and PhD) took place. To improve the capacity of NARS to effectively contribute to achieving goals of the Network, training is indispensable. There is need to intensify this activity by increasing the number of trainees and countries. Strong linkages in seeking support from the network partners (IARCs, international organizations, universities, INTSORMIL, NGOs, etc.) should be pursued in the area of postgraduate training, since the Network cannot finance this kind of training.

MONITORING TOURS

ROCARS conducted a one-week monitoring tour to Mali and Burkina Faso in 1995 and another two-week tour to Cameroon, Nigeria, and Chad in 1997. Monitoring tours are conducted to:

- Examine the general execution of ROCARS.
- Identify weaknesses/opportunities for improving NARS research capabilities.
- Enhance exchange of ideas among the various partners.

PROPOSED FUTURE VISION AND DIRECTION (ORIENTATIONS)

In the future, there is a strong need to focus on technology transfer issues. Several technologies have been tested but are still “on the shelf.” For varieties, because of the nonfunctionality of national seed systems, it is not easy to know the level of areas covered. However, some grassroots work is now conducted by the Network through the CBSS. The establishment of small observatories within countries will help develop a clearer perception of market trends and farmers’ needs for quality seed.

Concerning processing aspects, emphasis should be placed on industrial purposes. Interesting results have been obtained by ITA in Dakar, Sotuba in Mali, and PROCELOS in Burkina Faso. The promotion of a market-driven approach needs to be sustained by the creation of a development process based on sorghum. Work to date suggests investment into the following set of products:

- Ready-to-cook preparations of traditional dishes (such as couscous).
- New food products (such as pasta, biscuits, tortillas, snack foods, weaning food).
- Feed for poultry and livestock.
- Industrial uses of the grains (such as starch, brewer’s malt, vegetable oil).

For this, it is vital to engage the full involvement of the private sector, which will help open new avenues of collaboration and also funding. In this area, strong collaboration between the sorghum and millet Networks is needed. These two crops share similarities in processing methods and potential products. At this level, there is a need to merge the two networks while perhaps keeping the breeding programs separate.

APPENDIX D: SUMMARY ANALYSIS OF THE MILLET NETWORK: ROCAFREMI— WEST AND CENTRAL AFRICA MILLET RESEARCH NETWORK

THE IMPORTANCE OF MILLET WITHIN SUBREGION

Pearl millet (*Pennisetum Glaucum* (L.) R.Br.) is cultivated in the WCA on a regular basis in the sahelian, sudano-sahelian, and sudano-guinean zones. Millet is consumed locally in the form of couscous, pasta, pap, and beverages. Approximately 40% of the world production of millet comes from Africa and WCA supplies about 80% of that production. The main producing countries are Nigeria, Niger, Burkina Faso, Mali, Mauritania, and Senegal. Nigeria accounts for 40% of the subregional production by itself, while Niger accounts for 20%. Generally, yields are very low and variable. Average yields have stagnated, even decreasing in many parts of the Sahel where rainfall is low and irregular. Millet production increased from 8.5 MT in 1990 to over 11.0 MT in 2000, mostly due to the increase in cropping area, not yields, thus aggravating the pressure on cultivated and especially more marginal lands.

MAJOR REGIONAL CONSTRAINTS TO INCREASED PRODUCTION

The major constraints to millet production in the WCA are biotic (low productivity of local varieties, diseases, insects, weeds, and birds); abiotic (erratic rainfall, intermittent drought, wind erosion, low soil fertility); and socioeconomic in nature. Downy mildew, caused by *Sclerospora graminicola*, is the main millet disease in WCA (most traditional varieties are susceptible). Infection can cause up to 50%—sometimes 90%—yield loss. Some yield reduction is also caused by smut and ergot. The parasitic weed *Striga* is widespread, especially in low fertility fields and can cause up to 70% in yield losses. Millet is subject to attack by numerous insects. Stem borers and various species that attack the head or panicle, including Cantharid beetles, are the most important. Socioeconomic constraints to increased millet production in the region include lack of inputs (quality seed, organic and mineral fertilizers, pesticides), nonavailability of credit, weak extension services, and the underdevelopment of a millet processing industry.

HISTORICAL BACKGROUND OF NETWORK

In the mid-1980s, under ICRISAT's aegis, several WCA millet scientists decided to meet in order to (1) establish regular working relations, (2) harmonize working methodologies, and (3) set-up exchange mechanisms. The Network was baptized ROCAFREMI (in French) and WACMRN (in English), and financial support was provided by the Swiss Cooperation. Initial recommendations focused mainly on the need to relocate research from experiment stations to the real world of farmers' environments.

The ROCAFREMI Network was built upon farmers' needs and NARS requests. It became particularly strong after the organizational meeting that took place in Zaria, Nigeria in 1992. After that meeting, country coordinators (correspondents) were nominated and five international organizations brought their expertise into the Network: ICRISAT, INSAH, CILSS, CIRAD and ORSTOM. During the past two years (2003 and 2004), ROCAFREMI has faced a serious funding shortage. The Swiss donors wanted to see ROCAFREMI combined with the sorghum Network (ROCARS), but that strategic option was not well received by NARS scientists and has

not yet occurred. As a result, the Swiss suspended their financial support, and ROCAFREMI activities have been curtailed accordingly.

PURPOSE, OBJECTIVES, AND MAJOR PROGRAM COMPONENTS/ACTIVITIES

The purpose of the network is to assist national millet programs to better tackle production and processing constraints that prevail within the WCA subregion. The overall goal is to improve the production and utilization of millet and enhance farmers' welfare in WCA countries.

Three generations of projects were designed and have been conducted by lead centers. The first set sought to increase the genetic diversity of millet varieties through projects:

- P1: Varieties and seeds to farmers. Lead Center (LC)—Niger.
- P2: Study of the panicle insects' bioecology and Development of control methods for farmers. LC—Mali.

The second generation of projects targeted the improvement of millet-based production systems:

- P3: Improvement of downy mildew control. LC—Senegal.
- P4: Improvement of millet-based production systems. LC—Burkina Faso.

The third generation consisted of multidisciplinary, integrated projects:

- P5: Improvement of millet processing technologies. LC—Senegal.
- P6: Integrated pest and disease management. LC—Burkina Faso.
- P7: Development of improved varieties and seed production with farmers' participation. LC—Niger.

The major activities of ROCAFREMI have been oriented to the following:

- Selection of genetic material adapted to biotic and abiotic stresses.
- Improvement of millet-based farming systems.
- Development of appropriate processing and storage techniques.

The following strategic options were chosen to help fulfill the Network's objectives:

- Better use of human resources available within the subregion.
- Development of partnerships.
- Technology transfer of technologies and production and processing techniques.
- Development of market-driven opportunities for millet.
- Coordination with assistance from CORAF.

ORGANIZATIONAL STRUCTURE

The major implementing structures of the ROCAFREMI are (1) the projects, (2) the workshop, (3) the SC, and (4) the coordination unit (CU).

The Network Projects

During the annual review, NARS scientists submit proposals on specific themes with clear objectives, indicators, and strategy. Projects are selected on a competitive basis. A lead country is then chosen to animate the group. The project team evaluates ongoing activities, shares experiences, and plans forthcoming activities based on the project specification sheet. Projects constitute the scientific operational structure of the Network.

The principles underlying the projects' implementation are:

- Project efficiency
- Transparency in implementation
- Complementarities to national research efforts
- Full involvement of all member countries to ensure wide diffusion of the results.

The Network Workshop

The workshop is a sovereign organ whose participants meet every two years and whose responsibilities are defined as follows:

- Appoint the management entity of the Network.
- Admit new members.
- Decide on the establishment of new projects.
- Monitor the progress of ongoing projects.
- Make strategic decisions concerning the life and orientations of the Network.

The Workshop is chaired by the SC's president, who ensures the participation of scientists from member countries and institutions as well as the donors.

The Steering Committee

The SC functions as a board of trustees and is responsible for ensuring the proper implementation of the workshop's decisions. Its members are scientists from the NARS and from partners involved in conducting research activities of the Network and are nominated by the workshop for a period of two years, renewable once. The SC meets a minimum of twice a year and monitors the progress of Network activities. Specifically, the SC validates Network orientations, program implementation, and project budgets.

The Coordination Unit

The CU is the only permanent and remunerated body of the Network. It is responsible for supporting and ensuring follow-up on projects and activities conducted by the Network. The CU is composed of the coordinator, a secretary, and a driver. The coordinator is a senior scientist who comes from the subregion and is nominated for a two-year mandate renewable once. The CU is the executive organ of the Network and is responsible for managing the information flow between Network members, projects, countries, institutions, and partners. The coordinator finalizes reports for each project and ensures their distribution to participating scientists, countries,

and institutions. Periodically, a bulletin for general information is produced for distribution to Network members.

ROCAFREMI's monitoring strategy is based on three components:

1. Monitoring of the budget according to the annual action plan (by the project leader and the CU).
2. Monitoring tours organized for a small group of scientists to visit the research activities carried out in the various countries, and check on their compliance with the action plan and their efficiency with regard to the means available.
3. Annual projects' meetings (good opportunities for scientists and partners to evaluate projects' implementation, finalize conclusions from the monitoring tours, and determine new work plans.

ROCAFREMI has prepared and distributed a variety of scientific publications, project reports, and bulletins. Posters, videos, and brochures have been developed to target a larger public audience. In 2002, a series of 10 brochures was released, which highlighted seven different projects (P1–P7) as well as three cross-cutting topics on “Strategic options,” “Bibliography,” and “The Lessons Learned by the Network.” The production of a handbook titled “Reference related to the production and utilization of pearl millet in the WCA subregion” was planned but has not been released yet due to lack of funding.

BUDGET

Over 10 years (1991–2000), the Swiss Development Cooperation (SDC) provided total funding of US \$5,684,260. This amounted to an average of nearly \$570,000 per year, a level which is somewhat higher than what the other Networks were receiving. Table D1 is the statement of account provided by ICRISAT. The proportionate breakdown of expenditures is as follows:

Table D1

Activity	Expenditure (%)
Coordination	18.01
Operational cost and travel	23.24
Steering committee meeting	0.74
Project meetings, workshops	1.30
Preparation of new projects	0.47
Coordination	18.01
Operational cost and travel	23.24
Steering committee meeting	0.74
Project meetings, workshops	1.30
Preparation of new projects	0.47
Development of strategic plan	0.37
Co-funding search	0.37
Travel during the transition phase	0.64
Publications, translation, etc.	1.53
Contribution to NARS research	35.36

Provision for country account auditing	0.09
Regional training	3.26
Equipment	1.38
Overheads: (22% on expenses at network level and 6% on contribution to NARS)	9.66 3.58
TOTAL	100

It appears that around 60% of the budget was used to cover NARS expenditures such as research activities, meetings and workshops, and operational and travel costs. Compared with other Networks, ROCAFREMI seemed to give more attention to NARS involvement through the lead centers option. Coordination costs are shown as about 18% of the total, although some support costs tied to the coordinator may be in other line items. A clearer identification of coordination costs (salaries, overheads, and running costs) would be helpful in increasing the confidence of the NARS in continuing to have the CG centers host the Networks. Overheads at the Network level seem to be high (9.66%), whereas the five lead centers share only 3.58% of the total budget.

Funds were released in advance by the CU for implementation of project activities. The remaining money was then disbursed according to the level of justified expenditures. ICRISAT's fiscal office monitored the statements of expenditures of the Network and closely followed the amount of the budget expended.

PROGRESS SINCE THE 1996 EVALUATION

Besides the Network's scientific and technical aspects, ROCAFREMI has also encouraged the experimentation and introduction of various methods of collaboration and the management and exchange between countries and partners from diverse areas. Before the evaluation, the Network worked mainly on increasing the genetic diversity of millet to better meet farmers' needs (high yielding varieties, varieties tolerant to downy mildew). Since 1996, the orientation changed to speed up the promotion of millet through the improvement of processing technologies.

Dozens of varieties, and even some hybrids, have been identified for diffusion within member countries. In addition, the Network has recommended the following cultural practices:

- Millet/legume association (cowpea, groundnut, or soybean)
- Rotation (millet/cowpea, continuous millet)
- Weekly treatment with 2.5 l/ha of Neem oil starting at the flowering stage to minimize damage caused by Cantharid beetles.

According to interviews conducted by NARS partners, millet production has been limited in its development for several reasons. One important factor is the time-consuming process from threshing to semi-finished products (e.g., flour, semolina). Several processing technologies and equipment for millet processing have been tested in recent years through the Network:

- Gas-powered cylindrical rotating dryer (improves preservation of the quality of processed products, a major handicap for processors)
- Improved equipment for threshing millet and the Engleberg-Amuda for dehulling millet
- Polycereal destoner
- Resinoid discs for the PRL decorticator
- Successful completion of physical-chemical characterization of flours, semolinas, and weaning flours (couscous, snacks), and tests on various packaging materials (humidification level, evolution, quality).

Cakes produced from acidulous millet were well appreciated by consumers in Mali. Millet has shown its potential in the bakery industry and might be used to create new market opportunities, saving foreign currency used to import wheat. One example is the incorporation of a certain proportion of wheat with millet flour in a variety of products.

In addition, ROCAFREMI has obtained promising results in the following areas:

- Production and characterization of weaning foods
- Storage and packaging studies for flour, semolina, and fura
- Use of malting properties of millet
- Quality criteria identification of flour and semolina
- Different millet-based weaning foods such as
 - 70% millet/20% cowpea
 - 60% millet/15% groundnut/20% cowpea/5% malt
- Weaning foods tested for maternity clinics
- Production of shelf-stable sun-dried ogi.

PROPOSED FUTURE VISION AND DIRECTION (ORIENTATIONS)

Through projects P1, P2, and P7, the Network has produced significant results that need to be scaled up. Several improved varieties have been selected by farmers but still need further farm-level testing and evaluation. The participatory approach in varietal development and variety diffusion has not been used thus far. Training sessions on these methods should be organized in order to help plant breeders conduct PVS trials and facilitate farmers' involvement in the varietal development process.

The use of PPB can also open new avenues for a better response to consumers' needs. By using PPB, breeders can improve the genetic diversity and offer various opportunities to end-users. The establishment of working populations, however, is expensive from a commercial perspective. The use of molecular markers can be of some assistance and help shorten the time spent by breeding programs in generating new varieties.

The availability of seed remains a great issue for ensuring widespread diffusion of new varieties. The Network should facilitate the implementation of the CBSS. CBSS is a decentralized approach based on farmers' know-how and indigenous practices in seed production, seed conservation, and seed distribution. CBSS fosters the evolution of seed producers toward the mar-

ket. Training sessions should be organized to ensure the efficient use of CBSS tools and facilitate the development and reinforcement of farmers' groups.

In the near term, special emphasis should be placed on helping NARS scientists publish, whether in scientific or more popular, extension-type journals. Interesting results exist but need to be capitalized through appropriate means of communication. Publication in refereed journals should be encouraged, and ICRISAT should help NARS scientists gain access to these journals.

Partnerships among farmers and their organizations, extensionists, NGOs, and the private sector (seed producers, processors, and traders) should be strengthened. The involvement of all interested parties in carrying out Network activities is important to ensure the sustainability of funding. Partners should be asked to help find funding for some activities.

Promising results have been obtained in millet processing through projects P5 and P6. More funds should be devoted to this area in order to ensure the full and active participation of specialists in grain processing technologies. The adoption of market-oriented strategies should be embraced in order to generate revenues for farmers and to help make millet a profitable cash crop as well as a staple food crop.

Effective technology transfer techniques need to be better established. ROCAFREMI's next phase should strongly encourage and support the transfer of technologies toward farmers and the market. That effort means a considerable percentage of funds should be allocated to:

- Training
- Studies on socioeconomic constraints and gender issues (major rural activities are conducted by women farmers)
- Diversification of grain use through processing and new product development (bread, cakes, cookies, pasta, etc.)
- Promotion of local varieties responding to specific needs
- Increased capacity building of farmers and their level of organization.

The Team recommends that ROCAFREMI consider realigning its budget such that roughly 30% is devoted to agronomic aspects (breeding, on-farm trials), 40% to technology transfer (demonstrations, release of technologies, seed production, and public awareness), and 30% to processing and promotion of new products. Coordination costs should be budgeted and accounted for separately.

Many aspects of technology transfer are shared in common by millet and sorghum, and even to a certain extent by maize and rice as well. Some activities could therefore be merged or at least put under a single CU with a view toward faster technology release and rapid impact. A crash program would be advisable for all four of these crops in order to speed up the release and diffusion of improved varieties and related technologies.

APPENDIX E: DAILY SCHEDULE

US AND CI BASES

28 JUNE 04

Effective date of contract signed between WARP and ARD for Networks Evaluation under RAISE Task Order.

30 JUNE 04

Team members Clarke and Simpson travel from home bases to ARD HQ in Vermont to begin assignment. Beye remains in Cote d'Ivoire.

1–2 JULY 04

Team receives orientation from ARD, discusses assignment, begins preparing work plan schedule (phase 1 in detail) and methodology, and confers with Beye in CI.

3–4 JULY 04

Clarke and Simpson travel from Vermont to Bamako, Mali, where they are joined by Beye from CI.

MALI

5 JULY 04

Team meeting in morning to discuss work plan, schedule and logistics. All afternoon visit and meetings at Samanko with WARDA and ICRISAT scientists.

6 JULY 04

In-depth briefing for team by WARP staff and CORAF representative (Dr. Nwalozie), and discussion of issues, work plan methodology, and schedule.

Afternoon meeting at INSAH (Dr. Neteyo, head of AGROSOC).

Evening meeting with representative from a Malian NGO (ADEF).

Working dinner with Dr. Ntare of ICRISAT.

7 JULY 04

Meeting at IER at Sotuba with Dr. Touré, sorghum breeder and Asst. ROCARS Coordinator.

Meeting with IER maize coordinator.

Meeting with ROCARS food scientist on research on sorghum processing.

Meeting with Dr. Diarisso, IER's Scientific Coordinator.

Meeting with Dr. Diourté, Nat'l ROCARS Coordinator.

Drive in late afternoon from Bamako to Segou with WARDA vehicle.

8 JULY 04

Drive from Segou to Niono in the Office du Niger (inland delta).

Meeting with the DG, then with a large group of Malian scientists active in ROCARIZ.

Drive back to Segou.

9 JULY 04

Drive from Segou to Cinzana. Meeting with IER Station Head, Dr. Samba Traoré.

Briefing by Cowpea Program leader, Dr. Mamadou Touré, on PRONAF (regional cowpea network).

Meeting and field visit with Dr. Traoré on millet and ROCAFREMI.

Drive back to Bamako.

10–11 JULY 04

Complete work plan and submit to WARP. Meeting at hotel on 11 July with WARP staff Kagbo and Oliveira.

12 JULY 04

Drive from Bamako to Sikasso.

Meetings in afternoon with Malian rice research scientists who are active in ROCARIZ.

Drive in late afternoon to Bobo-Dioulasso, Burkina Faso.

BURKINA FASO

13 JULY 04

Meeting with Director at INERA Station at Farako-Ba.

Meeting with Dr. Adam Neya, Nat'l ROCARS Coordinator.

Meeting with INERA scientists active in ROCARS.

Meeting with Dr. Youssouf Dembele, Nat'l ROCARIZ Coordinator.

Meeting with INERA scientists active in ROCARIZ.

Evening meeting with the DG of INERA, Dr. Hamidou Boly.

14 JULY 04

Meeting with Dr. Sanou, Cereal Program Leader for INERA and Nat'l WECAMAN Coordinator.

Meeting with INERA scientists active in WECAMAN.

Meeting with Staff at CIRB, inter-professional association involved with ROCARIZ.

Drive from Bobo-Dioulasso to Ouagadougou. Several stops to observe local farms.

15 JULY 04

Meeting in morning at INERA station at Kamboinsé with Dr. Kaboré, Interim Director.

Meeting with INERA scientists active in ROCARS. Meeting with INERA scientists active in ROCARIZ.

Meeting in Ouagadougou in afternoon at SAFGRAD HQ with Dr. Ouattara, Int'l Coordinator, and staff.

Meeting in evening at hotel with grain processors, including Ms. Kambou from PROCELOS (cereals promotion project).

16 JULY 04

Meeting in Ouagadougou with Dr. Magha at ROPPA, a regional farmers' organization network. Wrap-up session with Drs. Neya and Dembele.

Team meeting in afternoon to discuss evaluation findings to date.

Clarke departs for U.S. in evening.

17 JULY 04

Simpson and Beye depart by road from Ouagadougou for Niger.

Brief stop at INERA station in Fada-Ngourma but researchers absent.

Arrival at night in Niamey.

NIGER

18 JULY 04

Rest day.

19 JULY 04

Meeting at INRAN HQ in Niamey with Dr. Mahaman Issaka, INRAN Director General, and the Scientific Director.

Meeting at INRAN's Station at Kollo with the Director, Dr. Gabdakoye, and several INRAN scientists active in ROCARIZ.

Meeting with Dr. Botorou Ouendeba, INRAN Millet Breeder and former ROCAFREMI Network Coordinator.

Meeting with Dr. Issoufou Kapran, Sorghum Breeder, Member of ROCARS Steering Committee and former Nat'l ROCARS Coordinator.

Meeting at hotel with Dr. Sido Amir, Rice Breeder and ROCARIZ Nat'l Coordinator.

20 JULY 04

Meeting at INRAN in Niamey with Food Technologist.

Meeting at the ICRISAT station with the Senior Administrator/Financial Officer and several ICRISAT scientists involved in ROCARS and ROCAFREMI

Meeting at AGRYMET with Dr. Innocence Sarr, Nematologist/Virologist.

Meeting at hotel with Dr. Sido Amir and the President of a Farmers' Cooperative.

21 JULY 04

Travel from Niamey to Dakar, Senegal via Casablanca.

SENEGAL

22 JULY 04

Travel by car from Dakar to St Louis with Robert Kagbo, USAID/WARP.
Visit the WARDA Sahel Station.

23 JULY 04

Meetings at ISRA with Alioune Fall and ROCARIZ scientists.
Meeting with WARDA Scientists Kouamé Miézan and Mohamed Kebbah.
Meeting with Amadou N'Diaye, Director General of Delta 2000, rice processor.

24 JULY 04

Meeting with Mme Cissé Pedna Gueye, President, FEPRODES (NGO), and ROCARIZ Steering Committee member.
Travel by road from St. Louis to Dakar.

THE GAMBIA

25 JULY 04

Travel by road from Dakar to Banjul, the Gambia.

26 JULY 04

Meetings with network scientists at NARI Station outside of Banjul.
Meeting with Dr. Sidi Sanyang, ROCARIZ Coordinator.

27 JULY 04

Travel by road from Banjul to Dakar.

SENEGAL

28–30 JULY 04

Meeting with Daïb Diouf, ISRA Science Director in Dakar
Meeting with CORAF in Dakar
Meetings with NDiaga Dieng and Abdou Ndiaye National WECAMAN and ROCARS coordinators.
Meeting with Boubacar Ndoeye ITA Research Director and team of scientists.
Team meeting and report writing at hotel
Beye departs for Côte d'Ivoire on 30 July.

31 JULY 04

Simpson departs for U.S.

US AND CI BASES

2–12 AUG 04

Team works on summarizing and analyzing notes, preparing initial sets of issues and findings, and making arrangements for phase 2 travel set to start 13 Aug.

13 AUG 04

Clarke meeting in USAID/ Washington with Dr. Bahiru Duguma, Senior Ag. Advisor, and Meredith Soule and Eric Witte (CGIAR specialists).

Beye meeting with DG of CNRA and other staff in Abidjan, Cote d'Ivoire.

14–15 AUG 04

International travel by Clarke and Beye from DC and CI to Abuja, Nigeria.

NIGERIA

16 AUG 04

Drive in morning from Abuja to NCRI HQ at Baddegi near Bida.

Separate meetings with Dr. Mark Ukwungwu (Natl ROCARIZ Coordinator), then the DG of NCRI.

Group meeting with then Nigerian rice scientists active in ROCARIZ.

Return to Abuja in late afternoon.

17 AUG 04

Drive from Abuja to Ahmadu Bello University in Samaru near Zaria.

Meeting at NAERLS with Dr. Johnson Oyinbe, Natl WECAMAN Coordinator, and NAERLS Asst. Director.

Meetings with Nigerian maize scientists active in WECAMAN.

Visit to two fields of farmers involved in testing QPM maize varieties with WECAMAN support.

18 AUG 04

Meeting with DG and key staff at Premier Seed Nigeria (formerly Pioneer Seed) HQ in Zaria.

Group meeting at IAR with Natl ROCARS Coordinator and sorghum scientists.

Wrap-up discussion with Dr. Oyinbe.

Drive back to Abuja in late afternoon.

19 Aug 04

Meeting in morning at USAID/Nigeria with Andrew Levin and associate.

Meeting at IFDC, including discussion of New Rice Alliance. Separate meeting at IFDC with Natl Seed Service rep. Fly in afternoon from Abuja to Lagos, then drive in IITA vehicle to Ibadan.

Brief meeting in evening with Dr. Baffour Badu-Apraku, WECAMAN Coordinator.

20 AUG 04

All morning briefing on WECAMAN by Dr. Badu and discussion with team.

Meeting in afternoon with three IITA maize scientists active in WECAMAN.

Meetings with two WARDA liaison scientists based at IITA.

Meeting with IITA DG Hartmann.

Visit of WECAMAN maize nurseries with Drs. Badu and Menkir.

21 Aug 04

Meeting in morning with Dr. Stanford Blade, IITA Director of R4D.

Wrap-up meeting with Dr. Badu.

Drive in afternoon in IITA vehicle from Ibadan to Cotonou, Benin.

BENIN**22 AUG 04**

Rest day in Benin.

23 AUG 04

Full day of meetings at INRAB HQ in Cotonou.

Meeting with DG and Scientific Director.

Presentations by Natl Coordinators from all four Networks and discussion.

Roundtable discussion with all Natl Coordinators and Scientific Director.

Wrap-up session with DG and the rest of the group at end of day.

Evening meeting at hotel with William Bradley of USAID/Benin.

24 AUG 04

Travel by road all day (16 hours) in IITA vehicle from Cotonou to Tamale, Ghana.

GHANA**25 AUG 04**

Meeting with the DG of SARI and several staff.

Meetings with NARS scientists at SARI involved with ROCARS and WECAMAN.

Meeting with Northern Ghana Seed Growers Association, and visit to seed inspection lab, seed processing unit and seed storage facility.

26 AUG 04

Meeting in morning at MOFA regional office in Tamale with Director and Asst. Director, including discussion new ag. extension policy and research-extension-farmer linkages.

Visit to several certified seed fields near Tamale with seed grower.

Second meeting with Dg of SARI and key Network staff.

Final meeting with Network scientists on future directions and coordination structure.

Drive in late afternoon from Tamale to Kumasi (5 hours).

27 AUG 04

Meeting in morning at CRI with current and former Nat'l WECAMAN Coordinators (Marfo and Sallah) and several WECAMAN and ROCARIZ scientists.

Visit to local input dealer (seed and ag chemicals).

Visit to seed grower facility (former Ghana Seed Co.) and discussion with maize seed growers and observation of seed drying, shelling, conditioning, bagging and storage.

28 AUG 04

Work in morning on trip notes at hotel. Drive in afternoon from Kumasi to Accra (5 hours).

29 AUG 04

Rest day and work on draft report.

30 AUG 04

Team discussions and work on draft report.

31 AUG 04

Lengthy meeting in morning at FARA HQ with Dr. Monty Jones and assistant Ms Pura.

Beye travels by air in afternoon to Abidjan to return to home base.

1-2 SEPT 04

Clarke works on draft report.

3 SEPT 04

Meeting in morning at SG 2000 in Accra. Work on draft report. Evening departure for U.S. via Amsterdam. Arrival in Minnesota on 4 Sept afternoon.

US AND CI BASES

7-24 SEPT 04

Team works on preparing Discussion Draft which is submitted to WARP on 20 Sept.

Team continues to refine key parts of text and prepare PowerPoint presentation for delivery in Bamako the week of 27 Sept.

MALI

27–28 SEPT 04

Team travels from home bases to Bamako, Mali.

29 SEPT 04

Team continues to discuss report and prepare presentation.

30 SEPT 04

All day meeting to discuss report at WARP offices with team and key WARP staff.

1 OCT 04

Morning meeting with team, WARP staff, CORAF Executive Secretary and four Network Coordinators or their representatives. Afternoon wrap-session with team and WARP. Team departs late evening for home bases, arriving on 2 Oct afternoon.

US AND CI BASES

4 OCT–15 NOV 04

Team works on revising the report, based on comments from meetings held in Bamako and written comments from the partners. Final version submitted to WARP for final review on 3 Nov. Final report completed and printed by ARD and sent to WARP on 15 Nov.

APPENDIX F: LIST OF KEY ORGANIZATIONS AND PERSONS CONTACTED

MALI

WARDA (The African Rice Center)

Ousmane Youm	Assistant Director of Research; Rainfed Program Leader	Samanko
Inoussa Akintayo	Africa Rice Initiative Coordinator	Samanko
Moussa Sié	Lowland Breeder	Samanko
Alioune Diagne	Impact Assmnt. Economist	Samanko
Paul Kiepe	Science Coordinator, Inland Valley Consortium	Bamako

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics)

Bonny Ntare	Groundnut Breed; ROCARS Coordinator	Samanko
-------------	-------------------------------------	---------

USAID/WARP

Rolf Anderson	Team Leader, Food Security, NRM & Agriculture	Bamako
Robert Kagbo	Senior Ag Advisor and IEHA Coordinator	Bamako
Jorge A. S. Oliveira	Food Security & NRM Advisor	Bamako
Harry Bottenberg	Agricultural Development Advisor	Bamako

USAID/Mali

Mamadou A. Dembele	Environmental Officer	Bamako
Raghuram Shetty	Agric. Development Sp.	Bamako

IER (Institut d'Economie Rurale)

Niamoury Diarissou	Scientific Coordinator--IER	Sotuba
Aboubacar Touré	Sorghum Breeder and Asst. ROCARS Coordinator	Sotuba
Ntji Coulibaly	Maize Program-Leader	Sotuba
Mamourou Diourté	Natl. Coordinator--Sorghum	Sotuba
Mme. Cissé	Food Scientist	Sotuba
Moussa Kane	Director General	Niono
Soungalo Sarra	Weed Scientist	Niono
Nianankoro Kamissoko	Agronomist	Niono
Bréma Guindo	Plant Breeder	Niono
Lassana Diarra	Plant protection	Niono
Bréhima Kamissoko	Plant Breeder	Niono
Minamba Bagayoko	Agronomist	Niono
Samba Traoré	Millet Program Leader	Cinzana
Mamadou Touré	Cowpea Program Leader	Cinzana
Abdoulaye Hamadoun	Station Director	Sikasso
Dr Yacouba Doumbia	Program Leader-Lowland Rice	Sikasso
Moro Traoré	Plant Pathologist	Sikasso

NGO

Assétou Kanouté	NGO Adaffe	Bamako
-----------------	------------	--------

INSAH (Institut de Sahel)

Laomaibao Neteyo	Head of AGROSOC	Bamako
------------------	-----------------	--------

Farmers

Abdoulaye Traoré	Farmer	Cinzana
Karim Guindo	Farmer	Cinzana
Alfousseyni Touré	Farmer	Cinzana

BURKINA FASO

INERA (*Institut de l'Environnement et de Recherches Agricoles*)

Adama Neya	Plant Breeder—ROCARS Natl Coordinator	Farako-Ba
Youssef Dembélé	Irrigation / Water Mgt—ROCARIZ Natl Coordinator	Farako-Bâ
Dabiré A. Rémy	Station Director of Fara Koba (CRREA)	Farako-Bâ
Sankara Stanislas	Agron. Crop. Systems	Farako-Bâ
Da Sassan	Sorghum Breeder/GRM	Farako-Bâ
Heima Drissa	Plant Breeder	Farako-Bâ
Rouamba Albert	Plant Breeder	Farako-Bâ
Ouadrégo Ibrahim	Pathologist	Farako-Bâ
Barro Soma Etienne	Soil Scientist	Farako-Bâ
Thioub Bouma	Nematologist	Farako-Bâ
Ouadrégo Léonard		Farako-Bâ
Georges Kambou	Ecotoxicologist	Farako-Bâ
Ouadrégo Issoufou	Entomologist	Farako-Bâ
Abdouss. Sawadogo	Nematologist	Farako-Bâ
Hamidou Boly	Director general INERA	Ouagadougou
Jean Zundi	Tech. Transfer Agr.	Ouagadougou
Compaoré Alain	Agronomist Filiere Riz	Ouagadougou
Sanoh Yacob	National Coordinator	Fada N'Gourma
Oumar Ouadrego	Crop Prod. Director	Kamboinsé
Ba Malick	Entomologist	Kamboinsé
Karim Traouré	Agron. Sorghum	Kamboinsé
Sylvain Victor	Agron./ Deputy Director	Kamboinsé
Zakary Segda	Rice Agronomist	Kamboinsé
Blaise Kaboré	Rice Agronomist	Kamboinsé
Kambiré Yacynthe	Sorghum	Kamboinsé
Hamidou Traoré	Weed Scientist	Kamboinsé
Barro Clarice	Sorghum Breeder	Kamboinsé

CIRB

Drabo Amadou	Agro-Economist Trainer	CIRB
Sawadogo Abdoulaye	Seed Producer	CIRB
Sawadogo Seydou	Seed Producer	CIRB
Théophile Dipama	Agro-Economist	CIRB

Farmers

Group of 15	Farmers	Samandiny
-------------	---------	-----------

SAFGRAD (Semi-Arid Food Grain Research and Development)

Dr Mamadou Ouattara	Internat. Coordinator	Ouagadougou
Evenunye Ananlete	Ad. Financial Officer	Ouagadougou
Michel Sedgo	Ex DG CNRST	Ouagadougou

IRSAT

Léguet L. Ganou	Food Technology	Ouagadougou
Ouattara Laurencia	Food Technology	Ouagadougou
Bougouma Boniface	Food Technology	Ouagadougou

ROPFA (Network of Small Farmers' Organizations and Producers of West Africa)

Mamadou I. Magha	Tech. Coordinator	Ouagadougou
------------------	-------------------	-------------

Private sector

Sansou Diego	Processor	Ouagadougou
Louise Kambou	Millet / Sorghum Initiative	Ouagadougou
Minougou Sophie	NGO on the Diversification utilization Mil./Sorg	Ouagadougou

NIGER

ROCAFREMI

Ouendeba Botorou	Former Coordinator, ROCAFREMI	INSORMIL
------------------	-------------------------------	----------

INRAN (*Institut National de Recherches Agronomiques du Niger*)

Mahaman Amir	Director General	Niamey
Sido Yacouba Amir	Agronomist	Niamey
Barkire Gabdakoye	Station Director	Kollo
Issoufou Kapran	Sorghum Breeder—ROCARS Natl Coordinator	Niamey
Mahamane M. Ghano	Agronomist NRM	Niamey
Basso Adamou		Kollo
Halidou Aboubakar		Kollo
Diallo A. Soumana		Kollo
Barkire Bourahima		Kollo
Dr Moussa Hassane	Director ST	Niamey
Mr Kaka Saley	Nutritionist	Niamey
Ramatou Seydou	Technologist	Niamey

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics)

Philippe Delfosse	Virologist	Sadore
Moussa S. Diolombi	Head of Finance	Sadore
Hame Abdou Kadi	Research Assistant	Sadore
Gospel Omanwa	Millet Breeder	Sadore

AGRYMET

Innocence Sarr	Nematologist/Virologist	Niamey
----------------	-------------------------	--------

GAMBIA

NARI (National Agricultural Research Institute)

Musa Bojan	Director General	Serekunda
Baboucar Mane	Plant Breeder / Cereal Program Coordinator	Serekunda
Ansumana Gibba	Agronomist	Serekunda
Momodou N. Faye	Crop. Resource Mgt	Serekunda
Momodou L. Darbor	Entomologist	Serekunda
Ansumana Jawju	Agroforestry	Serekunda
Musa Suso		Serekunda
Amidou Mbalo	WECAMAN Natl Coordinator	Serekunda

ROCARIZ

Sidi Sanyang	ROCARIZ Coordinator	Banjul (normal base: WARDA in Mali)
--------------	---------------------	-------------------------------------

SENEGAL

ISRA (*Institut Senegalais de Recherches Agronomiques*)

Daïb Diouf	Scientific Director	Dakar
NDiaga Dieng	National Coordinator	Bambey
Abdou NDiaye	National Coordinator	Bambey
Alioune Fall	Director of Centre	St Louis
Souleymane Diallo	Weed Scientist	St Louis
Moustapha Dièye	Soil Scientist	St Louis

ITA (Institut de Technologies Alimentaires)

Boubacar NDoye	Research Director	Dakar
Ibra MBaye	Adt Chef division céréales/ légumineuses	Dakar
Mme NDeye Doumouya	Chef Ateliers céréales et légumineuses	Dakar
Mme Rokhaya D. Gning	Chef Laboratoire de Chimie	Dakar

CORAF/WECARD (West and Central African Council for Agricultural Research and Development)

Paco Sereme	Executive Secretary	Dakar
Marcel Nwaloze	Scientific Coordinator	Dakar

Private Sector/Delta 2000

Amadou N'Diaye	Director General, Delta 2000	St Louis
----------------	------------------------------	----------

NGO

Mme Cissé Pedna Gueye	President, FEPRODES	St Louis
-----------------------	---------------------	----------

WARDA (The African Rice Center)

Kouamé Miézan	Irrigated Breeder; Program Leader Sahel Station	St Louis
Mohamed Kebbah	Production Economist	St Louis

COTE D'IVOIRE

CNRA (*Centre National de Recherche Agronomique*)

Sié Koffi	Director General	Abidjan
Tyo Tiémoko	Asst. Director General	Abidjan
Alphonse Bouet	Chercheur Riz	Abidjan
Beninga Marboua	Division Semences	Abidjan
Akanvou Louise	Chef Programme Maïs, Mil, Sorgho	Abidjan
Diomandé Kédro	DPRAD	Abidjan

NIGERIA

NCRI (National Cereals Research Institute)

A. A. Ochigbo	Director General	Baddegi
Mark N. Ukwungwu	Assistant Director & Natl ROCARIZ Coordinator	Baddegi
Maji A. T.	Rice Breeder	Baddegi
Yacubu Eyaji	Chairman of rice association Niger state Chapter	Baddegi
Andrew Saba Gana		Baddegi
Bright E. O.	Vertebrate Pest Ecology	Baddegi
M. E. Abo	Plant virologist	Baddegi
A. B. Umaru		Baddegi
B. D. Tarfa	Soil Scientist	Baddegi
F. A. Showemino	Plant Scientist	Baddegi
Frank C. Orakwe	Plant Scientist	Baddegi
Inuwa S. Usman	Plant Scientist	Baddegi
Mansil Yusuf	Plant Scientist	Baddegi
U. S. Abdullahi	Plant Scientist	Baddegi
T. M. Kude	Agric. Economist	Baddegi
Dominic D. Dagan	Plant Scientist	Baddegi

IAR (Institute for Agricultural Research)

T. K. Atala	Dean Agric/ Acting Director	Zaria
Ben Ahmed	Agricultural Economist	Zaria
Daniel Aba	Sorghum Plant breeder	Zaria
Mary Yeye	Sorghum Plant breeder	Zaria
Maigida D. N.	Agric. Econ./ Rural Soc.	Zaria
M. A. Djim	Agric. Economist	Zaria
John Gabriel	Agric. Economist	Zaria

NAERLS (National Agricultural Extension and Research Liaison Services)

Akpoko J. G.	Agric. Ext. & Rural Soc.	Zaria
--------------	--------------------------	-------

C. K. Daudu	-	Zaria
H. Mani	Agronomist	Zaria
Johnson E. Onyibe	Senior Extension Specialist	Zaria

NSS (National Seed Service)

L. O. Fajama	Seed Technologist	Abuja
--------------	-------------------	-------

USAID/Nigeria

Andrew Levin	Agric. Development Officer	Abuja
Abdulkadir Gudugi	Agric. Development Sp.	Abuja

Private sector

M. O. Omidji	Managing Director	Zaria
Prof. A. B. Obilana	Consultant	Zaria

IITA (International Institute of Tropical Agriculture)

Peter Hartmann	Director General	Ibadan
Stanford Blade	Director, Research for Dev.	Ibadan
Baffour Badu-Apraku	WECAMAN Coordinator	Ibadan
Sam Ajala	Maize Breeder	Ibadan
Abeke Menkir	Maize Breeder	Ibadan
Ranjit Bandyopadhyay	Plant Pathologist	Ibadan
Maziya-Dixon	Food Technologist	Ibadan

WARDA (The African Rice Center)

Olu Osiname	WARDA Coordinator (Nigeria)	Ibadan
Francis Nwilene	Liaison Scientist, Entomologist	Ibadan

BENIN

INRAB (*Institut National des Recherches Agricoles du Bénin*)

David Arodokoun	Director General	Cotonou
O. Delphin Koudande	Scientific Director	Cotonou
Pascal Ademi	Agronomist	Cotonou
Patrice Adegbola	Agro-Economist	Cotonou
Paul Houssou	Technologist	Cotonou
Aly Djima		Cotonou
Chabi Yallou	Maize Breeder	Cotonou
Sigibert Dossou Yovo		Cotonou
Joseph Vincent Ntou	Direction scientifique	Cotonou

USAID/Benin

William Bradley	Ag. Governance Specialist	Cotonou
-----------------	---------------------------	---------

GHANA

MOFA/AES (Ministry of Food & Agriculture/Agricultural Extension Services)

M. A. Addel	DRDA	Tamale
S. A. Adongo	RDA	Tamale
Eden Traore	Seed Inspector	Tamale
Martin Kpeme	Seed Inspector	Tamale
Yahaya Alhassan	Seed Inspector	Tamale
Ransford Gyampoh	Seed Inspector	Tamale
Vincent Affram	Seed Inspector	Tamale
M. Yidana	Laboratory technician	Tamale
John Mark Ageeki	Laboratory technician	Tamale

CRI (Crops Research Institute)

K. A. Marfo	Economist	Kumasi
Peter Sallah	Nat. Maize Coordinator	Kumasi
Koffi Dartey	Rice Breeder	Kumasi
Stella A. Ennin	Agronomist	Kumasi

SARI (Savanna Agricultural Research Institute)

A. B. Salifu	Director	Tamale
J. B. Naab	Breeder	Tamale
S. K. Nutsugah	Plant Pathologist	Tamale
Ibrahim Atokple	Sorghum Breeder	Tamale
M. S. Abdulai	Breeder	Tamale

Producer Association

Patrick Apullah	Seed Grower Association	Tamale
-----------------	-------------------------	--------

Sasakawa Global 2000 (SG 2000)

Jonas Frempong	Accountant	Accra
----------------	------------	-------

FARA (Forum for Agricultural Research in Africa)

Monty P. Jones	Executive Secretary	Accra
Myra Wopereis-Pura	Special Assistant (ES)	Accra

APPENDIX G: TASK ORDER (SCOPE OF WORK)

I.1 BACKGROUND

For more than 15 years, USAID has supported the International Agricultural Research Centers (IARCs) to initiate and implement agricultural research networking projects in Africa, in collaboration with the National Agricultural Research Systems (NARS). In West Africa, the specific networks that benefited from the USAID support include the WARDA rice research network (ROCARIZ), the International Institute for Tropical Agriculture (IITA) maize research and development network (WECAMAN), the ICRISAT sorghum research network (ROCARS), and the natural resources management network (NRM InterCRSP) coordinated by Virginia Tech and implemented by the Institut du Sahel (INSAH).

Over the past decade, these networks were supported under the USAID Africa Bureau's (AFR/SD) Strategic Objectives (SOs). The latest of the AFR/SD's five-year (1998–2003) objectives were the "Adoption of Improved Agricultural Policies, Programs, and Strategies" and "Improved policies, programs, and strategies for sustainable technology development and transfer." The focus of the strategy was on (1) sustainable increased food security and addressing critical science and technology issues, marketing efficiency, and increased participation of the private sector and (2) creating stronger linkages between these programs, policies, and strategies, on the one hand, and positive nutrition outcomes, on the other.

In September 2003, responsibility for funding and management of the networks was transferred to the Agency's West African Regional Program (WARP) in Bamako, Mali. WARP covers 18 countries in the West African subregion and it has been given the mandate to implement the Administration's Initiative to End Hunger in Africa (IEHA). In taking on this mandate, it became clear that a review of the networks was necessary, a proposal that was subsequently strongly embraced by many of the key players involved in the networks.

Moreover, the level of USAID mission resources available for the networks is very low and insufficient (at current levels) to continue the same structure and funding levels as in the past. Given reduced levels of donor funding, the region must reflect on what the networks can do best, what they can afford to do, and how to reduce the dependence on donor funding in order ensure sustainability.

In addition, there are questions about the current effectiveness of the networks and some of their activities, as well as concerns about the appropriateness of the networks historical role and purpose. Is it time to modify their purpose in order to better serve the region and the NARS? Are the NARS adequately involved in the life of the networks, and responsible for animating the networks? These are factors which therefore contributed to the decision to conduct an evaluation of the networks.

IEHA

IEHA is an Administration Initiative that was launched at a workshop during the World Summit on Sustainable Development in August 2002 in South Africa and is implemented by

USAID and its partners. The objective of IEHA is to rapidly and sustainably increase agricultural growth and rural incomes in Sub-Saharan Africa so as to significantly reduce hunger and poverty in the region, thereby ensuring food security for future generations. Agriculture is a major component of this initiative, designed as a 15-year program (2003–2017) in selected countries in Sub-Saharan Africa.

The investments proposed for IEHA focus on deepening and broadening the impact of activities on rural incomes by addressing key constraints along the agricultural supply chain. In summary, these investments support six thematic areas as follows:

- Advancing science and technology.
- Developing efficient agricultural trade and market systems.
- Strengthening community-based producer organizations.
- Human and institutional capacity building.
- Sustainable environmental management.
- Ensuring that vulnerable groups and countries in transition are not left out.

As part of IEHA, selected participating USAID missions in *Focus Countries* (showing promising conditions and opportunities for achieving agricultural growth) are to develop action plans that respond to IEHA's goal and its corresponding reporting requirements. In the case of West Africa, the Agency's current implementing units for the IEHA are the WARP and the USAID missions in Mali, Ghana, and Nigeria. The action plans of the three country missions are complementary documents to their country strategic frameworks. These missions in turn will receive funding from IEHA for their agricultural programs. USAID/Washington also supports IEHA activities in the region (such as an information and knowledge support system).

In fulfilling its mandate, WARP intends to reinforce the activities of these three focus country missions and to collaborate with regional and international institutions working across the region so as to build on and strengthen subregional programs. For example, in the case of science and technology, regional collaboration will lead to the sharing and dissemination of improved technologies and best practices, thereby benefiting a much wider audience in West Africa. As a result, WARP is interested in determining what role that the networks should play, if any, within WARP's IEHA program. A related problem is reconciling the countries that are covered by the networks, given WARP's focus on West Africa as opposed to the more constrained focus of IEHA and the more expanded coverage of CORAF (which also includes Central African countries).

AN EVOLVING VISION OF THE NETWORKS' PURPOSE AND ROLE

The purpose of these networks has been to (1) develop, test, and put into place mechanisms that will enable participating NARS in Africa to progressively assume greater responsibility for management, funding, and monitoring of regional agricultural research and (2) the development, adaptation, and use of sustainable agricultural technology. The goal was for NARS to access expertise, services, commodities, and supplies from the IARCs and other sources to support regional and national development objectives.

In the past, the Networks, which are ostensibly autonomous, have been coordinated by the IARCS. This deep involvement of the IARCS in coordinating the networks was both an advantage, due to the association with competent research centers and experienced coordinators (as well as IARCS ability to receive and managing donor funding), and a disadvantage, due to factors such as the high associated management costs of the centers as well as the negative impact on the NARS caused by a substitution or displacement effect (where the IARCS were carrying out research instead of the NARS), among other concerns.

Following the creation of the West and Central African Council for Agricultural Research (CORAF/WE CARD), CORAF has been jointly involved in coordinating research in the networks in collaboration with the IARCS (along with INSAH, which was responsible for coordinating research in the Sahel). However, the current vision of the networks among the key “owners” (the NARS, CORAF, INSAH, IARCS, and donors) is evolving. CORAF and others have suggested that the vision is now different from the past, notably at the levels of coordination, leadership, and purpose.

To quote from the meeting notes of a recent meeting between the networks, CORAF, IARCS, and USAID in Dakar, in November 2003, the Executive Secretary of CORAF said, *“En clôturant ce tour d’horizon, le SE du CORAF/WE CARD a expliqué en quoi la vision actuelle différerait de la conception passée des réseaux, notamment au niveau de leur coordination. En effet, la coordination doit permettre au réseau de jouer son rôle d’espace permanent de réflexion sur les problèmes de recherche, d’échange d’idées et d’informations, et de facilitation de la formulation des projets de recherche.... Le CORAF/WE CARD à travers ses SNRA (Systèmes nationaux de recherche agricole) est plus indiqué pour de telle coordination.*

Therefore, helping the Network owners to establish a common future vision of the Networks—and helping to lay down a clear path for implementation—should therefore be a particular focus of this evaluation. This is particularly true, given the autonomous nature of Networks—which should be animated by the NARS, in principle—and given the uncertainty of future funding streams from donors, including USAID. Ideally, the Networks should be coordinated by local structures, which will help ensure the perennity of the Networks. The Team will therefore deeply engage all the implementing partners (CORAF, INSAH, NARS, IARCS, other scientific partners, as well as other interested parties) in this review.

1.2 TITLE

Evaluation of the USAID-Funded Collaborative Agricultural Research Networks in West and Central Africa.

1.3 OBJECTIVE

The evaluation has two objectives. First, the evaluation will assess the current purpose and effectiveness of the Networks and provide guidance concerning their future orientation and operation, and for CORAF/WE CARD and the scientific partners on steps that might lead to more effective future networking. Second, the evaluation will provide input into donor decisions re-

garding future Network support. It will therefore be used by WARP to determine whether (and how) to continue support to the Networks, and how they fit into WARP's IEHA S&T program.

The Networks to be evaluated are as follows:

- West and Central Africa Sorghum Research Network
- West and Central Africa Collaborative Maize Research Network
- West and Central Africa Millet Research Network
- West and Central Africa Rice Research Network.

1.4 STATEMENT OF WORK

The evaluators shall:

1. Assess the role, objectives, and functions of the existing Networks in the region.
 - Are the Networks still responsive and capable of supporting the short- and long-term objectives of the NARS, CORAF, INSAH, affiliated IARCs, farmers, and other regional research partners as well as end-users?
 - Provide options and make recommendations (based on input from the owners and partners) about what the role, objectives, and functions should be, particularly in light of current realities (specifically, funding constraints, functions of different players in the region, regional priorities and needs, and the evolving regional vision).
2. Review and evaluate the effectiveness and activities of the current Networks.
 - Review the issues raised in Annex A on Network effectiveness.
 - Are the Networks focusing on the right problems (especially but not exclusively within their mandate)?
 - On the basis of the recommended Network functions, provide options and recommend what activities should be preserved and what should be dropped or changed.
3. Review the existing institutional frameworks (how the Networks are structured and operate), institutional linkages and collaborative arrangements (who does what in terms of leadership, coordination, research, execution, implementation, dissemination, or support functions), and research and dissemination processes (what Networks do in the R&D domain in the region).
 - On the basis of this review, propose program options and best institutional arrangements for effectively carrying out these functions.
 - What structure would the evaluators recommend that would be most viable and financially sustainable?
 - Under the recommended scenario, what is the role of the different Network participants and partners (be it CORAF, INSAH, IARCs, NARS, Network coordinators, and other key players).
 - Include an illustrative model of the roles and responsibilities of the different partners, and recommended implementation plan for these institutional arrangements. (If there are changes, how should they be implemented?)

- Are CORAF or the NARS capable of managing the Network funding (do they have the required accounting and reporting processes in place)? If financial support is routed to another entity other than the IARCs, how could this be done?
 - How do the Networks take advantage of the various priority-setting processes of CORAF and the NARS? Do they also conduct their own priority setting processes, and if so, are they adequately “participatory” (e.g., including farmers’ concerns and needs)? How do the Networks respond to emerging needs?
4. Assess whether all the existing Networks should be maintained and whether they could or should be expanded (or changed) to new crops/cereals, themes, issues, and problems.
- Are the Networks dealing with the right crops in the region?
 - Should the Networks continue to focus exclusively on the current crops?
 - Assess whether a cereals approach is the right approach to organizing Networks.
 - Can and should the research Networks be structured in such a way to address new and emerging themes?
5. Specifically address whether Network coordination should be consolidated, and provide guidance on the types, orientation, and operation of future Networks (or Network work groups) within a consolidated Network coordination structure.
- The evaluator should review examples of Networks in other regions, such as CLAN in Southeast Asia or elsewhere, to explore alternative Network structures.
 - Assess the ability and need for such a consolidated regional platform to operate additional research topics (aside from the thematic crops of rice, maize, millet, and sorghum). (Under a consolidated Network coordination approach, for example, the Network could operate multiple workgroups that preserve the current thematic cereal Networks (i.e., rice, maize, sorghum), but they could alternatively create new work groups to address new or emerging themes that are specifically of concern to NARS scientists. Such a self-organizing work-group approach would enable the Network to expand or introduce new areas of interest as scientists identify areas of concern, and are willing to self-organize around a theme or issue (such as cassava mosaic disease, as an example).
 - Specifically address whether a unified Network coordinator could feasibly coordinate multiple network workgroups, and what would be required to do this.
 - Provide guidance on recommended Network types, orientation, and operations if another approach (such as work groups) is recommended.
6. Assess whether WARP should continue to fund the Networks under the IEHA program.
- Provide options and recommendations for the minimum funding and recommended levels of funding necessary to support the program.
 - Provide specific recommendations for how USAID could provide funding to finance the Networks.
7. Provide guidance on options and alternatives for new sources of Network funding.

EVALUATION PROCESS

Because this evaluation is more future oriented than retrospective, this approach is intended to give the evaluator scope and flexibility to adapt the report to the conditions and findings reported during the course of the evaluation. However, annexed to this scope of work we are including an *illustrative* list of questions to help guide the evaluators. The evaluators are not required to explicitly spell out responses to all the questions (in the annex) in their report. They are included as additional detail of the concerns identified by WARP during the course of our management of the Networks and our interviews with concerned parties. However, all the basic thematic areas should be addressed (technology development, exchange and dissemination; institutional considerations; capacity building; Network administration and management; and financial sustainability).

The evaluation should be a three-stage process. In the first stage, the evaluator shall present a plan for the evaluation (evaluation work plan). In the second stage, the evaluator shall prepare an assessment of their initial findings. After preparation, it is expected that the evaluator will present these draft findings to CORAF and WARP, and subsequently to the IARCs, Networks, and NARS. If time permits, it is recommended that the evaluator attend the CORAF general assembly (scheduled for April 14–16, in Brazzaville, Congo) to obtain feedback and comment from the NARs and partners participating at this meeting. If time does not permit this vetting to take place at the CORAF general assembly, the evaluator should organize a meeting with the existing Networks, CORAF, USAID, and selected NARS to vet the plan. In the third stage, the evaluators shall incorporate comments from the interested partners, conduct any additional field visits, if necessary, and finalize the report and recommendations. The total evaluation period is estimated at eight weeks.

The evaluator is expected to prepare an evaluation work plan as a first deliverable. The USAID/WARP project manager and CORAF will review the evaluation plan prior to the start of work. The work plan should include a schedule, list of planned interviews, and methodology with planned interview questions.

We would underscore the importance of interviewing a wide range of Network owners, users and research partners in the region. Ultimately, WARP seeks to ensure regional buy-in and ownership of the Networks, so any recommendations have to be based on a model that will be acceptable in the region. Ideally, WARP seeks to help restructure the Networks into a model that will enable them to exist, even if or when funding is terminated. The evaluators are expected to interview key owners and partners, such as CORAF, INSAH, NARS, IARCs, farmer's organizations, the private sector, and other scientific partners, as well as USAID/Washington, USAID missions, embassy economic officers, and other donors. The evaluators should propose an initial list of people to be interviewed, and this list will be vetted and supplemented by USAID and CORAF.

The Team is expected to spend a total of six weeks in the field to carry out the evaluation. The team will visit representative countries selected by USAID/WARP and CORAF/WE CARD in consultation with the networks. Because of the size of the region, the evaluators are not expected to visit every country. It is expected that they should visit at least six representative countries in their evaluation. The countries proposed to be visited should be specified in the

work plan. Illustrative countries might include Senegal, Mali, Burkina Faso, Ghana, Nigeria, Niger, and Cote D'Ivoire (travel difficulties might preclude Cote D'Ivoire). The evaluator may suggest alternative countries.

The evaluation will comprise primarily field visits and interviews with the NARS directors and scientists, staff of scientific partners (IARCs), Network coordinators, ministries of agriculture, CORAF, and INSAH. In addition, the evaluators should contact USAID missions, selected NGOs, and other useful sources of information. The Team should interview USAID Network managers who have managed this program (these staff are in Washington, D.C.). The team will review relevant records and documents including financial records, as appropriate. Most these records will be found in the Network field coordination offices.

COMPOSITION OF THE TEAM

The evaluator should propose an appropriate Team. It is recommended that the core Team include a senior agronomist, as team leader, who is familiar with agricultural research programs or Networks in general; an agricultural economist, or equivalent, who is experienced in the region; and an independent local expert who is intimately familiar with the work of the existing Networks. Capability in both French and English by all team members is essential.

In addition, the core Team may be joined by the following:

- A representative from the IARCs (selected by the IARCs involved in the evaluation—the individual does not have to be from one of the IARCs to be evaluated).
- One representative from the NARS (jointly selected by the Networks to be evaluated).
- A representative from CORAF or InsaH.
- The evaluation will cover the travel and per-diem costs of these three representatives. The evaluation budget will not cover their salaries. It is not expected that these representatives will be able to participate on the entire evaluation schedule. USAID assumes that up to three trips of one week each might be taken by each representative (three people).

In addition, a USAID representative may accompany the Team on part of the evaluation process. The evaluation budget should not reflect the presence of the USAID representative, which will be funded independently by USAID.

In addition to the team, the IARCs, networks, and NARS will be invited, at their own expense, to have key reference people accompany the team during the field visits, as appropriate.

ANNEX A: ILLUSTRATIVE ISSUES AND QUESTIONS EVALUATING NETWORK EFFECTIVENESS

In addressing the evaluation, the evaluators should consider the following issues to help structure their work.

Technology Development, Exchange, and Dissemination

1. Assess the effectiveness of methods and procedures in place for:
 - a. Regional research strategic planning and priority setting.

- b. Reception and screening of technologies in the networks.
 - c. Monitoring the implementation of network research programs.
 - d. Evaluation of impacts from regional research efforts.
2. Assess the effectiveness of Network research and technology exchange in terms of:
 - a. Relevance of the research undertaken to the participating countries.
 - b. Extent of technology transfer from scientific partners, including IARCs to NARS and among the NARS themselves as facilitated by the Networks.
 - c. Extent to which member countries of the Networks rely on technologies/varieties developed by the IARCs and their collaborating partners.
 - d. Extent to which the Networks are supporting member country testing of technologies under on farm conditions.
 - e. Extent to which the Network provided training, exchanged germplasm, shared disciplinary expertise, and developed technologies to national needs.
 - f. Extent to which the Network involved participation of various private sector groups, including NGOs, and producer organizations.
 3. Assess the extent to which the Networks have increased availability, access, and adoption of sustainable technologies in the region.
 - a. Include a listing of technologies released in the past two to three years, and those in the pipeline.
 - b. How might information flow be improved among scientists and the various participants in the commodity chain?
 4. Has the publication and dissemination of Network-generated technology been adequate? How might it be improved?
 5. Briefly state the Network's planning and programming process in relation to the IARC programs.
 - a. Do the programs complement each other?
 - b. How might this be improved?
 6. On the basis of the above, recommend ways to strengthen technology development, exchange, and dissemination by the Networks.

Institutional Considerations

1. Do the Networks and IARC programs complement each other and how might this be improved?
2. Can the Networks be structured more toward a partnership-type relationship with the IARCs?
3. How can CORAF assume a more productive role in coordination?
4. Is there a strong sense of Networks ownership by national scientists and how can it be improved so that the Networks are fully integrated into the national programs, thereby avoiding duplication of efforts and promoting sustainability.

5. Assess the capacity of selected NARS and determine the extent to which the NARS may be ready to take over Network management and coordination of technical programs and scientific leadership.
6. Recommend steps or modifications to the Networks, including participation of a wider partnership—private sector inputs providers, processors, and the like, leading toward the achievement of objectives and financial sustainability.

Capacity Building

1. How effective has the Network, in collaboration with the IARCs, been in training national scientists?
2. Is the Network having an impact on the NARS contribution to national development objectives of participating member countries?
3. Does the Network increase NARS resources or substitute for them?
4. What are the prospects for maintaining the Networks without current IARC backstopping?

Network Administration and Management

1. Assess IARC contribution to the Network in terms of:
 - Providing qualified Network coordinators
 - Effectiveness of logistical and administrative support to the coordinators
 - Technical backstopping of Network research programs
 - Technical coordination of research activities
 - Training
 - Alignment of scientific partners' support in the region with Network priorities
 - Use of scientific partners' core funding to support and backstop Network activities
 - On the basis of the above, recommend ways the scientific partners' contribution can be strengthened.
2. Assess the effectiveness of NARS participation in the Networks in terms of:
 - Allocation of personnel on a full-time basis to Network activities (number and level of training) and other resources.
 - Integration of Network-sponsored research into the national program.
 - Effectiveness of supervision and quality of results.
 - Effectiveness of the steering committee in providing technical leadership.
 - On the basis of the above, recommend ways to strengthen the participation of NARS in the Networks.
3. Assess the responsiveness of present Networks to regional priorities and recommend ways, if necessary, to make the programs more effective.
4. Identify best practices in providing cost-effective approaches for organization, management, coordination, and/or governance of regional collaborative research Networks.
5. Recommend possible Network structuring options and purpose including consolidation in terms of being more sustainable and more responsive to the CORAF and NARS current objectives.

6. Develop a prototype technical and administrative organizational chart showing linkages and relationships—CORAF, NARS, IARCS—on the basis of No. 5 above for a modified Network scenario.

Financial Sustainability

As part of the recommendation to be proposed in No. 5 above, how can the Networks move toward self-sustainability?

I.6 DELIVERY SCHEDULE

The team leader will submit two paper copies and an electronic copy in Microsoft Word of the draft report to USAID and CORAF no later than five weeks after the start (field visits) of the evaluation.

The draft report will be presented by the team leader (or a suitable representative from the Team) to a review committee composed of USAID, CORAF, INSAH, the Network Coordinators, and selected NARS representatives. Travel to this meeting by the above review committee members (excluding the USAID representative) should be budgeted and financed by the evaluation contractor.

Subsequently, based on comments received during the review and on written comments from USAID (due to the consultant within two weeks after the committee review), the consultant shall prepare a revised final report incorporating any necessary changes or modifications. The consultant should build time into the schedule in anticipation of fairly significant commentary which could be received at this meeting. This final report (two paper copies and an electronic copy in Microsoft Word) is due at WARP's Bamako Office four weeks after receipt of the review committee comments.

The report should include the following:

1. Executive summary
2. Introduction including a brief project context, description, and purpose
3. Methodology used in carrying out the evaluation
4. Assessment of Network activities and effectiveness
5. Progress made since the last USAID Network evaluation in 1996
6. Evaluation findings, conclusions, and recommendations
7. Implementation plan
8. Appendices that include any technical and management issues raised during the evaluation requiring greater elaboration, a copy of the evaluation scope of work, a brief annotated bibliography of the documents and reports consulted, and a list of the persons and agencies contacted.

EVALUATION DELIVERABLES

Deliverable 1, Evaluation work plan

Deliverable 2, Draft Report:

Deliverable 3, Final Report.

APPENDIX H: KEY DOCUMENTS CONSULTED

ROCARIZ

- Yobouet, N.Y. and M.A.B. Fakorede (Comp.). 2001. *Summary of WARDA/NARS Task Forces Activities 1991–1997*. WARDA, Bouaké, Côte d’Ivoire, 204 pp.
- WARDA. 2000. Strengthening National Agricultural Research Systems in Africa through Collaborative Research Networks. *Annual Report*. WARDA, Bouaké, Côte d’Ivoire, 29 pp.
- — —. n.d. (2001). [ROCARIZ Project Summary]. 8 pp.
- ROCARIZ. 2001. Strengthening National Agricultural Research Systems Through Collaborative Research Networks. *Annual Report 2000/2001*. 16 pp.
- — —. 2003a. ROCARIZ-Funded Projects: 2002 & 2003. 10 pp.
- — —. 2003b. Strengthening National Agricultural Research Systems Through Collaborative Research Networks. *Annual Report 2003/2004*. 15 pp.
- — —. 2004a. Improving Sustainability in African Rice-Based Systems: Component 1: Enhancing partnerships in regional rice-research and development in West and Central Africa (ROCARIZ). *Annual Report 2003/2004*. EU WARDA/CORAF Project. 12 pp.
- — —. 2004b. ROCARIZ-Funded 2004 Projects. 6 pp.
- — —. 2004c. ROCARIZ: Rapport d’Avancement. 12 pgs.
- — —. 2004d. Strengthening National Agricultural Research Systems through Collaborative Research Networks. *Quarterly Report January–March 2004*. 3 pp.
- — —. 2004e. Strengthening National Agricultural Research Systems Through Collaborative Research Networks. *Quarterly Report April–June 2004*. 3 pp.
- Sanyang, S. n.d. ROCARIZ Evolution and Follow-up Action. 8 pp.
- Sanyang, S., Ajayi, A., and Sy, .A.A. 2003. *Proceedings of the Second Biennial Regional Rice Research Review (4Rs 2002), 9-12 April 2002 (eds)*. WARDA Proceedings Series no. 2 Vol 1. The Africa Rice Center (WARDA), M’bé, Bouaké, Côte d’Ivoire. 161 pp.
- Sido, Y.A. n.d. Activités ROCARIZ au Niger. 29 pp.
- WARDA. 1996. West Africa Rice Development Association Annual Report 1996. WARDA, Bouaké, Côte d’Ivoire.
- — —. 1997. West Africa Rice Development Association Annual Report 1997. WARDA, Bouaké, Côte d’Ivoire.
- — —. 1998a. Task Forces: A successful mode of operation with National Partners. *WARDA Annual Report 1998*. WARDA, Bouaké, Côte d’Ivoire.
- — —. 1998b. West Africa Rice Development Association Annual Report 1998. WARDA, Bouaké, Côte d’Ivoire.
- — —. 1999a. West Africa Rice Development Association Annual Report 1999. WARDA, Bouaké, Côte d’Ivoire.

- — —. 1999b. The West and Central Africa Rice Research and Development Network. A proposal submitted to USAID. May 1999. 112 pp.
- — —. 2000. West Africa Rice Development Association Annual Report 2000. WARDA, Bouaké, Côte d'Ivoire.
- — —. 2001a. *Merger of WARDA Task Forces and CORAF Rice Network*. WARDA, Bouaké, Côte d'Ivoire, 23 pp.
- — —. 2001b. *Monitoring Tour 2001 Report*. WARDA, Bouaké, Côte d'Ivoire, 8 pp.
- — —. 2002a. WARDA/NARS Partnership: An African Success Story. Report of the Third Biennial WARDA/National Experts Committee Meeting, 11-13 June 2002, June, M'be Côte d'Ivoire. 40 pp.
- — —. 2002b. West Africa Rice Development Association Annual Report 2001 - 2002. WARDA, Bouaké, Côte d'Ivoire.
- — —. 2003a. ROCARIZ-Led Monitoring Tour 2003. WARDA/NARES Collaborative Projects. 29 September to 10 October. 8 pp.
- — —. 2003b. WARDA The Africa Rice Center Annual Report 2002-2003. WARDA, Bouaké, Côte d'Ivoire.
- — —. 2003c. WARDA/NARS Partnership: An African success story. Report of the Third Biennial WARDA/National Experts Committee Meeting 11-13 June, 2002, M'be, Côte d'Ivoire. 40 pp.
- WARDA. 2004a. Strategic Plan 2003–2012. The Africa Rice Center (WARDA), M'bé, Bouaké, Côte d'Ivoire. 58 pp.
- WARDA. 2004b. Sustaining National Rice Research and Development in a Changing Institutional Environment Through Collaborative Networking. 3 pp.

WECAMAN

- Badu-Apraku, B., M.O. Akoroda, M. Ouedraogo, and F.M. Quin. 1997. Contributing to food self-sufficiency: maize research and development in West and Central Africa. *Proceedings of a Regional Maize Workshop*, 29 May–2 June 1995, Cotonou, Benin Republic. WECAMAN/IITA.
- Badu-Apraku, B., M.A.B. Fakorede, M. Ouedraogo, and F.M. Quin. 1999. Strategy for sustainable maize production in West and Central Africa. *Proceedings of a regional Maize Workshop*, IITA-Cotonou, Benin Republic, 21-25 April 1997. WECAMAN/IITA.
- Badu-Apraku, B., M.A.B. Fakorede, M. Ouedraogo, and R.J. Carsky. 2001. Impact, challenges and prospects of maize research and development in West and Central Africa. *Proceedings of a Regional Maize Workshop*, 4-7 May 1999, IITA-Cotonou, Benin Republic. WECAMAN/IITA.
- Badu-Apraku, B., M.A.B. Fakorede, M. Ouedraogo, R.J. Carsky, and A. Menkir. 2003. Maize revolution in West and Central Africa. *Proceedings of a Regional Maize Workshop*, 14-18 May 2001, IITA-Cotonou, Benin Republic. WECAMAN/IITA.

- Badu-Apraku, B. 2004. WECAMAN Strategy for Sustainable Maize Research and Development in West and Central Africa. WECAMAN/IITA. 22 pp.
- Badu-Apraku, B., M.A.B. Fakorede, and S.O. Ajala. 2004. Enhancing human resources for maize research and development in West and Central Africa: A networking approach. *J. of Natural Resources and Life Sciences Education (USA)* 33:77-84.
- Badu-Apraku, B., M.A.B. Fakorede, A. Menkir, K.A. Marfo, and L. Akanvou. (in press). Enhancing the capacity of national scientists to generate and transfer maize technology in West and Central Africa: Research, implementation, monitoring and evaluation. *J. of Experimental Agriculture*.
- Brader, Lukas. 2002. A study about the causes for low adoption rates of agriculture research results in West and Central Africa: Possible solutions leading to greater future impacts. Interim Science Council, CGIAR. SDR/ISC: IAR/02/22, Working Document. FAO. 33 pp.
- Enyong, L., O. Coulibaly, A. Adesina, A. Youri, A. Raman, and C. Thé. 1999. Dynamics of maize production, adoption of improved varieties and food security in the northern region of Cameroon. Pp 365-376 in B. Badu-Apraku, M.A.B. Fakorede, M. Ouedraogo, and F.M. Quin (eds.) *Strategy for sustainable maize production in West and Central Africa*. Proceedings of a Regional Maize Workshop, 21-25 April, 1997, IITA-Cotonou, Benin Republic.
- Fakorede, M.A.B., B. Badu-Apraku, A.Y. Kamara, A. Menkir, and S.O. Ajala. 2003. Maize revolution in West and Central Africa: An overview. pp. 3-15 in B. Badu-Apraku, M.A.B. Fakorede, M. Ouedraogo, R.J. Carsky and A. Menkir (eds.) *Maize revolution in West and Central Africa. Proceedings of a Regional Maize Workshop*, 14-18 May, 2001, IITA-Cotonou, Benin Republic. WECAMAN/IITA.
- Hartmann, P. 2004. An approach to hunger and poverty reduction for Sub-Saharan Africa. IITA. 18 pp.
- IITA. 2003? Annual Report 2002. IITA. 48 pp.
- Laraba, I. 2001. Impact économique de la recherche et de la vulgarisation du maïs au Burkina Faso. Pp 68-78 in B. Badu-Apraku, M.A.B. Fakorede, M. Ouedraogo and R.J. Carsky (eds) *Impact, challenges and prospects of maize research and development in West and Central Africa*. Proceedings of a Regional Maize Workshop, IITA-Cotonou, Benin Republic, 4-7 May, 1999. WECAMAN/IITA.
- Onyibe, J. E., C. K. Daudu, J. G. Akpoko, and E. N. O. Iwuafor. 2001. Challenges of maize technology transfer in marginal zones. In *Impact, challenges and prospects of maize research and development in West and Central Africa*. Proceedings of a Regional Maize Workshop, IITA-Cotonou, Benin Republic, 4-7 May, 1999. WECAMAN/IITA.
- WECAMAN. 1998. A Five-Year Strategic Plan (1998-2003). Submitted to USAID by IITA. 109 pp plus attachments.
- WECAMAN. 2003a. Annual Report of WECAMAN: 2002/2003. Submitted to USAID and the Nippon Foundation. WECAMAN/IITA. 23 pp.

- — —. 2003b. Report of the Twelfth Meeting of the Research Committee of WECAMAN. Part 1: Review of the Progress Reports on the Collaborative Research Projects funded in 2002 under the USAID Grant. Cotonou, Benin Republic, 10-12 April, 2003. 345 pp.
- — —. 2003c. Five-Year Strategic Plan (2004-2009). Submitted to USAID by IITA. 82 pp.
- — —. 2004a. Synthesis Report on WECAMAN for the period of 1997 to 2003. 97 pp.
- — —. 2004b. WECAMAN Publications during the period 1997 to 2004. 7 pp.

ROCARS

- Akintayo, I. and J. Sedgo (eds). 2001. Towards Sustainable Sorghum Production, Utilization, and Commercialization in West and Central Africa: Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network. Bamako: ROCARS/ICRISAT. 305 pp.
- Akintayo, I. 2001. Workshop on Mid-term Evaluation of the Strategic Plan of WCASRN (1998-2003). Bamako, 23-26, April 2001. Coordinator's Activity Report: Period 1998-2001. 26 pp.
- CIRAD/CORAF/ICRISAT/INTSORMIL/ROCAFREMI/WCASRN. 1998. A Market-Driven Initiative for Millet and Sorghum Development in West and Central Africa. A proposal developed by CIRAD, CORAF, ICRISAT, INTSORMIL, ROCAFREMI and ROCARS.
- ICRISAT. n.d. ICRISAT-NARS Relationships in West and Central Africa. 6 pp.
- — —. 2003. Food from Thought. A series of narratives on the practical application of research conducted by ICRISAT and its collaborators. FTE Number 9. 6 pp.
- INERA (Burkina Faso). 1995. Plan Stratégique de la Recherche Agricole (Document principal, p. 22)
- INRAN. 2002. Appui à la promotion de sorgho: Test de transformation et commercialisation du couscous et de la farine de l'hybride de sorgho NAD1. Rapport d'activités 2001 – 2002. ROCARS.
- Ratnadass, A., O. Ajayi, P.S. Marley, and I. Akintayo (eds.). 1997. Insect Pests of Sorghum in West and Central Africa. Proceedings of a training workshop 14-23 October, 1996 (ROCARS-ICRISAT-CIRAD), Samanko, Mali. Montpellier: CIRAD.
- ROCARS. 2001. Report of the West and Central Africa Sorghum Research Network Extraordinary Steering Committee Meeting. Lome, 15- 16 November 2001. 4 pp.
- — —. 2004a. February to September 2004 Workplan. 5 pp.
- — —. 2004b. Minutes of the Extraordinary Steering Committee Meeting. Bamako, 19-22 January, 2004. 13 pp.
- WCASRN Steering Committee/ICRISAT. 1995. Enhancing Sorghum Production and Utilization in West and Central Africa through Collaborative Development and Transfer of Sustainable Technologies: A Project Proposal submitted to USAID to support the West and Central Africa Sorghum Research Network.

- WCASRN and ICRISAT. 1998. Strategic Plan of the West and Central Africa Sorghum Research Network 1998-2003. 63 pp.
- WCASRN. 1998. Good Recipes from Sorghum. First Addition. WCASRN in collaboration with the Food Technology Laboratory of Rurale Economy Institute of Mali. 20 pp.
- WCASRN/ROCARS. 2000. Fighting Hunger by Networking. 9 pp.
- — —. 2002. Highlights of Achievements 1998-2002. 32 pp.

ROCAFREMI

- ICRISAT. 1986. Cooperative Programme for West Africa. International Crops Research Institute for the Semi-arid Tropics. Annual report. 32 pp.
- Jean, Nyemba Ambela. 1996. Réseau Mil et Transfer de Technologies : Les défis à relever. ROCAFREMI. 192 pp.
- ROCAFREMI. 1996a. Bulletin d'Information/Information Newsletter. No. 8 Janvier/January 1996. 33 pp.
- — —. 1996b. Requete de Financement. Aupres de la Cooperation Suisse au Developpement. Phase de 1996 à 2000. Mars 1996. 60 pp.
- — —. 1997. Reunion Comite Directeur ROCAFREMI. Douala, Cameroun, du 8 au 12 Avril 1997. 24 pp.
- — —. 2000. ROCAFREMI Annual Report. April 1999 – March 2000.
- — —. 2001. ROCAFREMI. Bulletin d'Information. No. 11 Avril/Juillet 2001. 12 pp.
- — —. 2002a. Amélioration des systèmes de production à base de mil. ROCAFREMI— Résultats du projet P4 (1992–1999). 2002. 42 pp.
- — —. 2002b. Evaluation de l'Opération Pilote: Contractualisation, Cas de Sénégal, Dakar, Sénégal, 2002, 14 pp.
- — —. 2002c. Summary of ROCAFREMI Final Report: 1991–2002.
- — —. n.d. ROCAFREMI: A dynamic millet network for West and Central Africa. Vision, Action, and Impact. 16 pp.
- — —. n.d. Transfert de Technologies: Operations pilotes dans 4 pays du sahel. 7 pp.
- — —. 1993–1996a. Rapports annuels des pays participants au projet P1 (Burkina Faso, Cameroun, Côte d'Ivoire, Mauritanie, Niger, Nigéria).
- — —. 1993–1996b. Rapports de synthèse des pays participants (Burkina Faso, Cameroun, Côte d'Ivoire, Mauritanie, Niger, Nigéria).
- — —. 1997. Rapport final d synthèse des activités du projet P1: Sélection et mise à disposition des paysans des variétés et des semences appropriées. Doc. ROCAFREMI. 39 pp. + annexes.

- — —. 2000. Rapport réunions annuelles des projets P4, P5, P6 et P7. Niamey, 22–24 Mars 2000. 87 pp.
- — —. 2002. Bibliographie du mil: La petite bibliothèque du ROCAFREMI. Brochure de synthèse des travaux du réseau. ROCAFREMI-ICRISAT. 48 pp.
- — —. n.d. Futur Réseau Mil-Sorgho. 6 pp.
- Saley, K. and D. Dramé. 2002. ROCAFREMI. Project P5. Promotion du Mil par l’Amélioration des Technologies de Transformation. Recueil des Méthodes d’Analyse du Mil. 98 pp.

USAID

- Christensen, C. 1994. Agricultural Research in Africa: A review of USAID strategies and experience. Technical Paper No.3. SD Publications Series. Office of Sustainable Development, Bureau for Africa.
- BIFAD, 2003. Renewing USAID Investment in Global Long-Term Training and Capacity Building in Agriculture and Rural Development. Washington, D.C. 35 pp.
- Bingen, R.J., W. Judy, and T. Shilling, 1991. Final Evaluation: Semi-Arid Food Grains Research and Development (SAFGRAD). USAID/Africa Bureau Project 698-0452
- Bingen, R.J. and D.W. Brinherhoff, 2000. Agricultural Research in Africa and the Sustainable Financing Initiative: Review, lessons and proposed next steps. Technical Paper No.112. SD Publication Series. USAID/Office of Sustainable Development/Bureau for Africa.
- Gilbert, Frederick E. 2003. Current USAID Science and Technology Activities in West Africa and How they Might be Augmented: A Contribution to the West Africa Regional Program Initiative Action Plan for the Initiative to End Hunger in Africa. Abt Associates, Inc. 21 pp.
- Holdcroft, L.E., G.K. Kinyondo, and M.G. Blasé. 1993. Final Evaluation: Strengthening African Agricultural Research and Faculties of Agriculture. USAID/Africa Bureau SAARFA 698-0435.
- Mullenax, J., B. Gelaw, J. Brown, J. Sedgo, S. Camara, and J. Suh. 1996. An Evaluation of Regional Research Networks for Rice, Sorghum, Maize and Rice: A collaborative research program in West Africa among National and International research and development agencies. USAID/Africa Bureau Project 698-0478, Policy, Analysis, Research, and Technical Support.
- Oehmke, J.F, P. Anandajasekeram, and W.A. Masters. 1997. Agricultural Technology Development and Transfer in Africa: Impacts achieved and lessons learned. Technical Paper No. 77. SD Publication Series. USAID/Office of Sustainable Development/ Bureau for Africa.
- Partnership to Cut Hunger and Poverty in Africa. 2002. Now is the Time: A plan to cut hunger and poverty in Africa. 82 pp.
- Rachie, K.O. 1989. Evaluation Report on Seven SAAFRA Commodity Networks and Other Activities. December 1988 – May 1989. 28 pp.
- Sander, J.H., T. Bezuneh, and A.C. Schroeder. 1994. Impact Assessment of the SAFGRAD Commodity Networks. USAID/Africa Bureau.

- USAID/AFRICA BUREAU. 1998a. Good Practice in Competitive Grant Making: Application for support of ASARECA Affiliated Networks (draft cop).
- — —. 1998b. Guidelines for Network Strategy Planning.
- USAID/Ghana. 2004. Initiative to End Hunger in Africa: Action Plan. (FY2004/5–FY 2008/9).
- USAID/Mali. 2003. Initiative to End Hunger in Africa: Action Plan. (FY03–FY08).
- USAID/Office of Sustainable Development/Bureau for Africa. 1994. Regionalization of Research in West and Central Africa: A synthesis of workshop findings and recommendations. Banjul, The Gambia, March 14-16, 1994. Technical Paper No.4. SD Publication Series.
- USAID/West Africa Regional Program (WARP). 2003. Initiative to End Hunger in Africa. Action Plan. VOLUME II: IEHA Context & the WARP Program for Cutting Hunger in West Africa (Vol. 4a, 4b, 4c).
- — —. 2004. Initiative to End Hunger in Africa. Action Plan Supplement. WARPS' Strategy for the Initiative to End Hunger in Africa. Additional Supporting information. February 2004. 55 pp.

CORAF AND FARA

- CORAF/WECARD. 2001. Rapport de la 12ème Assemblée Générale du CORAF. Libreville, Gabon, du 16 au 20 Juillet 2001.
- — —. 2003a. Competitive fund manual of CORAF / WECARD. 26 pp.
- — —. 2003b. Plan of Action: 2004–2006. Adopted by the Executive Committee in December 2003. 28 pp.
- — —. 2003c. Plan of Action 2004–2006 of the West and Central African Council for Agricultural research and development coraf/wecard. 15 pp
- — —. 2003d. Procès-verbal de la rencontre entre le CORAF/WECARD et l'USAID Concernant les réseaux de research. Dakar, 10 novembre, 2003. 11 pp.
- — —. 2003e. Strategic Plan for Agricultural Research Cooperation. 124 pp.
- — —. 2004. Report of the 15th Meeting of the General Assembly of CORAF/WECARD. 46 pp.
- FARA. n.d. Catalyzing innovation and change in agricultural research for development in Africa: The Role of the Forum for Agricultural Research in Africa (FARA). Strategic Plan (2002-2012) and Implementation Framework (2002-2006). 18 pp.
- — —. 2003a. Annual Report 2002. 44 pp.
- — —. 2003b. *FARA News*. Newsletter of the Forum for Agricultural Research in Africa. Vol. 1, No. 1. October 2003. 8 pp.
- — —. 2004. *FARA News*. Newsletter of the Forum for Agricultural Research in Africa. Vol. 2, No. 1. March 2004. 8 pp.

- Fraisse, Jean-Olivier. 2004. Organizational Assessment of West and Central African Council for Agricultural Research and Development (CORAF/WECARD). 28 pp.
- ODI. 1999. CORAF Initiative: Strengthening Research-Extension-Farmers' Organization Linkages in West and Central Africa. Overview Paper, June 1999. Prepared for CORAF by the UK Department of International Development and the French Ministère de la Coopération.
- Sereme, P. and L. Netoyo. 2004. La Coopération Scientifique Agricole en Afrique de l'Ouest. Ministerial Conference on Harnessing Science and Technology to Increase Agricultural Productivity in Africa: West African Perspectives. Ouagadougou, Burkina Faso, June 21-23, 2004.

OTHERS

- African Union/SAFGRAD. n.d. The African Union Specialized Office for the Promotion of Agricultural Research and Development in the Semi-Arid Zones of Africa (AU/SAFGRAD): An instrument of integration for food security in Africa 5 pp.
- CMA/WCA. 2001. Activity Report of the Conference of Ministers of Agriculture of West and Central Africa (CMA/AOC). November 1999–May 2001. 24 pp.
- East Africa Agricultural Research Network. 1993. Proceedings of the East Africa Agricultural Research Network Workshop, Technical paper No. 3.
- Eicher, C.K. and M. Rukuni. 2003. The CGIAR at 31: Independent meta-evaluation of the Consultative Group on International Agricultural Research. Thematic Paper, The CGIAR in Africa: Past, Present, and Future. The World Bank Operations Evaluation Department. Washington, D.C.
- Eicher, Carl K. 2004. Rebuilding Africa's Scientific Capacity in Food and Agriculture. Staff Paper 2004-12. Department of Agricultural Economics, State University. East Lansing, Michigan.
- FAO/ICRISAT. 1996. The World Sorghum and Millet Economics: Facts, Trends and Outlook
- ISNAR/WARDA. 2001. Workshop on a Collaborative Platform for Agricultural Research in Sub-Saharan Africa. The Hague: ISNAR; Bouaké: WARDA. 29 pp.
- InterAcademy Council. 2004. Realizing the Promise and Potential of African Agriculture: Science and technology strategies for improving agricultural productivity and food security in Africa. 266 pp.
- Jones, Monty P. and Adama Traore. n.d. Perspectives on Partnerships of NARS-SRO-CGIAR-FARA. 10 pp.
- Kane, S. and C.K. Eicher. 2004. Foreign Aid and the African Farmer. Staff Paper 2004-13. Department of Agricultural Economics, State University. East Lansing, Michigan.
- Michelsen, H., L. Zuidema, C. Hoste, and D. Shaprio. 2003. Improving Agricultural Research at University in sub-Saharan Africa: A study guide. ISNAR Research Management Guideline No. 6. The Hague: ISNAR. 116 pp.

- NEPAD. 2003. Comprehensive Africa Agriculture Development Programme. 102 pp.
- Oehmek, J.F. and E.W. Crawford. 1993. The Impact of Agricultural Technology in Sub-Saharan Africa: A synthesis of symposium findings. MSU International Development Paper No. 14. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- OAU/SAFGRAD. 1995. 15 Years of Service to National Agricultural Research Systems and Farmers in Food Grain Research and Production. 12 pp.
- OAU/STRC-SAFGRAD. 2000. Transfer and Commercialization of Agricultural Technologies: Experiences in West Africa. West Africa Small Grants Program (1998-2000) Final Report. OAU/STRC-SAFGRAD, Ouagadougou, Burkina Faso. 51 pp.
- ROPFA. 2003. L'Avenir de l'Agriculture: A travers les exploitations familiales? 10 pp.
- SAFGRAD.SCO. 1991. Strategy for Transferring Network Coordination and Leadership to NARS. Ouagadougou: SAFGRAD/SCO. (Cited in Bingen et al., 1991).

APPENDIX I: PROGRESS IN IMPLEMENTING RECOMMENDATIONS OF THE 1996 EVALUATION

Comments related to the progress of specific Networks since the 1996 evaluation have been incorporated into the individual Network reviews found in section 3.1 of the present report. In this section, the Team has briefly summarized its assessment of progress achieved with respect to each of the major recommendations made by the 1996 evaluation team. The actual text of each of the recommendations from that report is shown in *italics* first.

GENERAL RECOMMENDATION: *It is recommended that USAID continue financial support to the Networks for a minimum of five years as detailed in the following sections.*

The Team finds that USAID did indeed implement this recommendation and, much to its credit, continued its long-term support to the Networks. However, a reduction in the level of support has occurred since 1996 (50% for ROCARIZ, for example), and of course the Networks have faced the special circumstances of the current transitional “bridging” period (fiscal year 2004) with its dramatically decreased budgets.

REC. 1: *It is recommended that any future phases of funding for the Networks be based upon a thorough design exercise. This should include an examination of the SD/AFR strategy and the role that the Networks are expected to play in its implementation. It should match Network (and NARS) capabilities to USAID goals and determine what aspects of the strategy can be implemented by the research Networks and what aspects require partnerships with other entities. It should also be used to determine the feasibility of shifting Network management to the NARS and to provide a plan for making the shift, if that is in fact possible.*

The Team is not aware of any design document nor has it been shown evidence of any design exercise carried out by USAID. This Team is also not aware that any special study was conducted to determine the feasibility of moving the management structure to the NARS. The 1996 report states that the NARS often have a strong human resource capability, but were said to “lack institutional stability and have operational weaknesses,” which prevent them from providing an effective institutional home. Of course, it should be noted that active NARS involvement in Network decision-making through the steering committees and other bodies means they are playing a strong leadership role. In that sense, the NARS have certainly been increasingly managing the Networks. The current Team addresses this important, controversial issue elsewhere in this report.

REC. 2: *The Team recommends that each Network conduct an assessment of current research activities and develop a five-year strategic plan. This assessment should evaluate current lines of research and their potential for producing sustainable technologies. The strategic plan should clearly identify targets in terms of the problems to be resolved and should contain strategies for achieving these targets, as well as annual benchmarks and projected impacts and mechanisms for monitoring.*

All of the Networks conducted a strategic planning process and prepared five-year strategic plans within a year or so of the 1996 evaluation, which were submitted to USAID and used as the basis for funding the Networks for the 1998–2003 period. The rice Network conducted such a planning process, but only in 1999, because WARDA-based but NARS-run task forces spent the previous year working through its harmonization and eventual merger with the CORAF rice network, a necessary precursor to the strategic plan. The maize Network prepared its second five-year plan in 2003. The plan elements listed in the Recommendation were more or less incorporated into those plans. Assessing impact is probably the most difficult and expensive task, and is often the weakest component of the Networks.

REC. 3: *The Team recommends that, contingent upon an acceptable strategic plan, funding to the Networks be substantially increased but targeted to four main areas:*

1. *Grants for linking research to processors that would help share the risks in developing and testing new products and processes.*
2. *Grants for producing outreach information and working on resolving policy constraints to extension.*
3. *Funds for carrying out a research assessment and developing a strategic plan.*
4. *Funds for creating an impact monitoring capacity.*

Network funding was not substantially increased as recommended; it was actually reduced over time as noted above. Hence no supplemental funds were made available for the four targeted areas. However, much to the credit of the Networks, they did incorporate these new areas or emphases into their strategic plans and into subsequent programming and fund allocation to NARS scientists, using existing funds. Real on-the-ground impact monitoring and assessments (subpoint 4) are time-consuming and expensive, as noted above; given shrinking funds, it is understandable that this activity was, for the most part, not carried out by the Networks.

REC. 4: *The Team recommends that the Networks assist member countries to develop sound technology transfer models, to implement efficient varietal release procedures, and to develop outreach information by targeting funds specifically to these ends. Further the Team recommends that Networks include socioeconomic criteria and analysis in developing and approving their research programs and activities.*

The Networks did begin to put more effort and resources into moving research results and improved technologies not only from the Networks to the NARS program but even from the NARS to farmer's fields. The Networks have also helped to promote new participatory research and development models such as participatory varietal selection, community-based seed systems, and participatory learning and action research, which are helping to ensure that new varieties and other technologies that are generated have much better chances of being accepted by end-users. ROCARIZ launched a technology transfer task force, which addresses many of the concerns expressed. It appears that it is only recently that socioeconomicists have joined the Network research teams, and that benefits are only beginning to emerge.

REC. 5: *It is recommended that the Networks, via their respective IARCs, facilitate NARS linkages to the Inter-Center Training Group (ICTG) and obtain support from the European Union for long-term training.*

The ICTG became the IARC-NARS Training Group (INTG), once based at ISNAR in The Hague, and has provided some excellent short-term training to Network members, usually on a cost-share basis. Course topics have included research management, organizational change in research institutions, and participatory research. Long-term training opportunities, whether offered by the EU or the U.S., have been dramatically reduced over the past 15 years (starting in the late 1980s in the U.S.), much to the dismay of the NARS and their partners who see the need to build new agricultural scientific capacity in the WCA. The large number of African scientists trained to the Masters and PhD levels in U.S. land-grant universities was a remarkable and substantial contribution by USAID. BIFAD has recently issued a report recommending that some form of a graduate degree training program be reestablished.

REC. 6: *The institutionalization of e-mail is crucial to NARS and network sustainability, and the Team strongly recommends that the Networks promote greater reliance on e-mail for sharing of information.*

Some initiatives were undertaken in this sense, such as the Africa Link Project through WARDA, which provided computers and Internet subscriptions to selected research stations in West Africa. Computers and cell phones are in good supply today, but poor quality land lines and inability of the NARS to maintain Internet subscriptions means the problem of e-mail messaging still exists. It remains a major challenge that is not yet adequately addressed, and a subject discussed elsewhere in the current report.

REC. 7: *It is recommended that USAID review this situation ["USAID management is too diffused... the decision-making process lacks coherence"] and clarify management and monitoring roles and responsibilities.*

The previous evaluation suggested that the USAID management entity for the Networks be transferred to REDSO/WA, so that it would be closer to the field. After some time, this responsibility was eventually transferred to the region—to WARP, since REDSO no longer existed. The current Team believes USAID has acted appropriately, but needs to be vigilant about ensuring that roles and responsibilities remain clearly defined.

REC. 8: *The Grant Agreement Amendments for the Networks contain requirements for financial audits of funds provided to the Networks. The Team recommends that the Networks benefit from a financial audit.*

The current Team understands that the IARCs are audited annually, and that this would include the Networks for which the IARCs serve as the executing agencies responsible for financial management. The Team understands that the World Bank completed an exhaustive audit of WARDA, including ROCARIZ, in 2002. Actual audits of expenditures made at the NARS level for research projects may not have been carried out, but the amounts involved are relatively small.

APPENDIX J: INSTITUTIONAL ASSESSMENTS FOR NETWORK COORDINATION

This appendix summarizes the Team's assessment of the key institutions in the WCA with respect to the role they currently play or may have the potential to play in overseeing and coordinating the four cereal Networks and other regional agricultural research and development Networks. The ability to deliver, in timely fashion, the necessary services required by Network members to achieve their objectives should be the principal criteria in assessing any institution's suitability to serve as the Network coordination host. The following are key capacity factors that the Team considers necessary for effective Network coordination:

- Excellent communication facilities, especially reliable and consistent access to high-speed Internet connectivity, for e-mail and Web page management.
- Demonstrated transparent and efficient administrative procedures with minimal bureaucratic red tape.
- Strong, proven financial management practices (budgeting, accounting, timely receipt and expense processing and reimbursement, rapid receipt and transfer of funds, internal audit capabilities), with at least some experience in supporting activities of a subregional nature.
- Ability, if necessary or requested, to pre-finance grants to Networks throughout the subregion.
- Strong and broad scientific and research institutional capacity, with active research programs on the crop(s) and cropping systems indicated.
- Good logistic and transportation support (easy, priority access to vehicles and good international travel links).
- Suitable documentation (library) and publication facilities.
- Bilingual (French-English) capability of main support staff.
- Independence and autonomy allowed to the Network coordinator, especially in terms of Network policies, decision-making, programs, travel arrangements, and others.

I. NARS: NATIONAL AGRICULTURAL RESEARCH SYSTEMS

Much has changed since the last Networks evaluation commissioned by USAID in 1996, and it is clear that some positive changes have occurred within the NARS and that, in some cases, much stronger NARS have emerged. In addition, certain NARS expressed a strong interest and desire to the Team, as well as readiness and willingness, to assume full leadership as the coordination base for the Networks. In fact of course, the NARS as a whole already plan, decide, and run the Networks' programs. As a result, it may indeed be logical for one or more carefully selected NARS to now assume administrative control of one or more of the Networks (even a combined Network) instead of an outside entity such as the IARCs, especially since the NARS have such a vested interest in the Networks and their success. In addition, it is evident that some of the leading NARS have the sufficient capacity for providing necessary scientific backstopping and for organizing the Network's training programs. The Team also notes that some of the NARS have improved their financial and administrative procedures to the standard expected by the Networks and required for effective Network performance.

Nonetheless, based on interviews by the Team with dozens of NARS scientists and a number of management-level officials, very few of the NARS can honestly claim that their communication facilities, administrative procedures, and financial management systems are strong and efficient enough to handle multicountry Networks easily and smoothly. Communication links, especially Internet connectivity, which are extremely vital for these Networks, are generally poor and unreliable. This situation needs to be reversed with urgency, which is why the Team has made a strong recommendation to that effect in this report. Administrative procedures within most NARS still tend to be slow and bureaucratic, with much red tape to overcome. Rapid disbursement of project funds to many different locations may be very difficult for the NARS. The ability to pre-finance grants, though done by many NARS internally for Network-funded research, may not be possible when it involves large sums and a large number of countries and programs.

In addition, few if any NARS have the experience in cross-regional coordination and support that is required by the Networks. The Team also questions the wisdom of a NARS, no matter how well qualified and suited to the task, taking on a regional role of this kind, when national programs are almost universally underfunded and need the fullest attention of both the scientists and the national leadership. Networks will require much extra effort which many NARS can ill afford to divert from their own national focus. Another issue facing the NARS is the difficulty in overcoming the natural suspicions that a NARS is showing bias against other NARS in program funding and implementation. Partiality, whether real or perceived, is a genuine concern.

In brief, the Team believes that several NARS could serve effectively as the Network coordination base or host at this stage and are capable of meeting all of the challenges outlined above. The real question, however, may be whether it is really prudent for an individual NARS to take on such responsibilities given the cost, not only financial but also in many other ways that go beyond the budget that would be accorded by the Network. If there are problems with the current organizational arrangement (and there are some, as discussed in this report), they can most likely be fixed. And as many NARS scientists and even leaders told the Team, they certainly do not want to jeopardize the relationship or lessen the collaboration with the IARCs, which provide a number of benefits for them. In any case, the NARS are for all practical purposes managing the Networks completely themselves right now, without taking on such a burden. Regardless, it is important that the NARS not underestimate the task and responsibilities of assuming this role nor the true costs and high level of expectations that will naturally come with this role.

2. IARCS: INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

The great strength of the IARCs (also called CG centers because they operate under the auspices of the Consultative Group for International Agricultural Research, or CGIAR) like IITA, WARDA, and ICRISAT hosting the Network CU is that they represent a relatively large, first-rate scientific capacity (critical mass) with long experience in food crop R&D in the region. This is a strong advantage in terms of the scientific and technical backstopping role of a coordinator.

They have the best communication facilities; donor-acceptable, proven, and necessary internal financial controls; ability to pre-finance large amounts of grants when necessary; facilities for large meetings and conferences, workshops, and practical hands-on training at all levels; and quality publication and printing facilities. Many of the IARC staff today in fact come from the NARS system, so they “know the territory” and certainly know and appreciate what the conditions are like in the typical NARS environment. All the IARCs in the WCA have multiple sites or locations which is useful for a Network. They have good, ongoing connections with scientists at the ARIs of Europe, North America, and elsewhere.

Their one unfixable “weakness,” by definition, is that they are not a NARS—and many believe that Networks are for, of, and by the NARS—and therefore that a NAR, not an IARC, should host the Networks. This belief is unfortunate if not somewhat unfair, given that the original aim of the Networks was to strengthen NARS-IARC collaboration. It was clear to the Team that there exists a certain sense of rivalry, competition, and even envy (perfectly understandable) on the part of the NARS toward the IARCs, especially because of the level of resources available to each. There is also the widespread perception among NARS scientists in the WCA that the IARCs are retaining a disproportionate amount of the Network funding and are benefiting from Network funding beyond an appropriate level.

There also exists a sense in some quarters that the IARCs have exerted more control over the Networks than necessary or advisable. It is probably true that the IARCs should have made more of an effort to empower the independence and autonomy of the Networks.

Another critical issue facing the IARCs is their declining and uncertain funding. Regrettably, core funding has been seriously reduced, and the CG centers, at least the ones with operations in WCA, have become much more project-dependent. This has led to significant staff turnover and program changes. Several reviews of the CGIAR system, especially its role in Africa, are under way, both by individual IARCs as well as by the CGIAR secretariat. Dr. Paco Sereme, CORAF’s Executive Secretary, is co-chairing that review as FARA’s representative. It will be important for the Networks as well as WARP to follow the outcome of these reviews, as decisions may be taken that will affect the future ability of the WCA-based IARCs to play a continuing role in support of the Networks.

If the Networks are consolidated, especially into one single Network, and an IARC is requested to be the base, IITA might be the best suited among the IARCs in the subregion to be the host for the CU because of its history, size, facilities, mandate crops, and agro-ecosystems, and the like compared with ICRISAT and WARDA. Moreover, IITA seems to have given more freedom and flexibility to the WECAMAN NC to run his activities according to the directives of the Network (primarily the SC).

3. FARA: FORUM FOR AGRICULTURAL RESEARCH IN AFRICA (FORUM AFRICAÏN POUR LA RECHERCHE AGRICOLE)

Though created by the SROs and SPAAR in 1997, FARA did not become fully operational until 2002 and was housed initially with the FAO mission in Accra. It had recruited, as its first executive secretary, the highly regarded rice program leader from WARDA and primary developer of

the NERICA rices, Dr. Monty Jones, who was recently named a co-recipient of the 2004 World Food Prize. A year later (July 2003), FARA moved into its own offices in Accra. In two short years, FARA has made a strong start and impressive progress in developing its mission, formulating its strategic plan, organizing a series of productive planning meetings with its partners and stakeholders, and establishing its credibility.

As stated in its documents, FARA's primary functions are:

- Advocacy of the role of agricultural research (and thus increased financial support).
- Promotion of functional partnerships and strategic alliances (including the private sector and NGOs as well as NARS, ARIs, IARCs, and universities).
- Acceleration of the sharing and exchange of knowledge related to agricultural research.

It is expected that fulfilling these functions will lead to:

- Stimulating development and dissemination of new technologies and methodologies in natural resource management, GRM, and biotechnology.
- Stimulating agricultural policy and market development.

FARA's vision, adopted by its inaugural General Assembly, is to "enable Africa to achieve at least a 6% annual growth rate in agriculture by the 2020."

FARA has recently been integrated into and now provides leadership for Agriculture to NEPAD and the African Union. In November 2003, FARA was officially recognized as NEPAD's technical arm with respect to agricultural research. With its *Vision of African Agriculture* (2002) serving as a guiding framework for agricultural research and development in Africa, FARA contributed to the preparation of the Comprehensive African Agricultural Development Programme (CAADP) for NEPAD, especially chapter 5, which covers agricultural research, technology dissemination, and adoption. FARA has actively led and/or participated in a number of high-level agricultural policy forums and has published a number of important documents and reports, including two informative in-depth newsletters to date.

FARA also houses and supports several special projects: the Scientific and Technical Information System initiative with France designed to reduce the digital and technological divide, the Multi-country Agricultural Productivity Programme designed to secure substantially greater resources for agricultural development and research in Africa with help from the World Bank, the Regional Agricultural Information Systems (RAIS) workshops, the African Biosafety Initiative, the African Biosafety Program with Cornell University (U.S.), and the African Biotech Support program. It has made great strides in assuming its special niche and role as a continent-wide apex organization (still needs to add North Africa to the mix, but that is in the works) and in support of its three founding members (the SROs of CORAF, ASARECA, and SADC/FANR).

In short, FARA is a new organization, but it is already playing a leading and forceful role over all of Africa. Its mission lies at a much higher level than is appropriate for Network coordination, though it firmly believes in the value and importance of subregional agricultural Networks. As it freely admits, it does not have the capacity to provide the scientific backstop-

ping the Networks need. And, based on discussions with the executive secretary, it is not really the kind of role or function that FARA aspires or seeks to play, given its mission and mandate. The same cannot necessarily be said of its founding members (the SROs) but, for FARA, it has too many far more important Africa-wide matters to lead, pursue, advocate, and resolve.

4. CORAF/WECARD: CONSEIL OUEST ET CENTRE AFRICAIN POUR LA RECHERCHE ET LE DÉVELOPPEMENT/WEST AND CENTRAL AFRICAN COUNCIL FOR AGRICULTURAL RESEARCH

Based in Dakar, Senegal, and created in Paris in 1987 by leading research institutions in France and African Francophone countries, CORAF was designed to provide a forum for consultations and exchange of information and experiences on agricultural research among the 20-plus countries in the WCA subregion. Its stated mission is to encourage South-South exchanges, North-South collaboration by facilitating partnerships, training, identification of common objectives and research, implementation of projects, and the organization of subregional research teams. In short, CORAF (known now also by its English acronym, WECARD) seeks to strengthen the efficiency and coordination of agricultural research in the WCA subregion. According to a recent report, it is valued by its stakeholders for its contributions as “research coordinator, exchange facilitator, and mobilizer of financial resources....” (Fraisie, 2004).

The parallel or sister organizations for CORAF are ASARECA for Eastern and Central Africa and SACCAR (SADC/FANR) for Southern Africa. FARA, headquartered in Accra, Ghana, is the apex organization for these three subregional organizations (more on FARA below).

Quite frankly, the World Bank report (March 2004) on CORAF is quite troubling and one can only hope that this institution of which so much is expected will be able to rebound successfully from its past and current difficulties. Given its dire financial predicament and no certain or quick solution, it is totally understandable that some fear that CORAF may view and wish to use the Networks as a proverbial “cash cow” to help solve its financial problems. CORAF’s financial problems of course cannot be solved by “acquiring” the Networks, and its financial needs must not be the driving force or the rationale for assuming full administrative control of these Networks. It is considered by some donors and other regional organizations as a “research coordinator,” but in what sense? Strengthening the efficiency and coordination of agricultural research in WCA, as stated by the recent World Bank report, is an important role for CORAF, but this should not be construed that it therefore should or needs to do everything.

CORAF’s record is mixed in terms of its effectiveness in facilitating important Network harmonization efforts. Of particular concern is the inability to complete a successful merger of WECAMAN and the CORAF Maize Network, or broker the fusion of ROCARS and ROCAFREMI. Although CORAF was able to work with WARDA in merging the WARDA task forces and the CORAF Rice Network, this was less of a challenge. In that case, the WARDA National Experts Committee and CORAF General Assembly, both composed of the same NARS directors, mandated CORAF and WARDA to affect the merger, with WARDA providing much of the leadership in forming ROCARIZ.

Discussions over the potential merger of the WECAMAN and CORAF Maize Networks have been ongoing since as early as 1988 (Bingen et al., 1991), yet it still has not been completed.

In the case of the attempted fusion of ROCARS and ROCAFREMI, efforts carried on for more than two years without a successful resolution. As a result, the SDC, which had been providing bridging funds to ROCAFREMI during this period, terminated its support and the Network essentially collapsed. Given the importance of past and future donor funding, it will be essential that maximum efforts be made not to lose contact with those donors willing to support Network activities, as in the case of the Swiss. If CORAF is to fulfill its role as a “facilitator, coordinator, organizer” of agricultural research in the subregion, it will need to demonstrate effective leadership in undertaking these kinds of challenges that emerge.

Despite the stature and credentials of the new top leadership and management team at CORAF (Chairman, Dr. Koffi Sie, and Executive Secretary, Dr. Paco Sereme), the recent past history of this SRO makes the Team hesitant in recommending any central role in CORAF’s directly managing the Networks at this time. There is simply too much risk, and too much at stake. Over time, in the years ahead, as CORAF solves its deep financial problems, restores its reputation, and once again has the widespread support of national governments in the region, then possibly a different role could be considered. It is noteworthy that only two or three countries are currently paying their annual membership dues to CORAF—a major vote of no-confidence—but one that can be reversed in time with strong, effective leadership and solid results. It was also suggested that CORAF is still struggling to shed its exclusive Francophone past and overcome the Francophone-Anglophone gap (continuing reports of poor attendance by Anglophone country representatives).

CORAF fulfills some but not all of the criteria cited above. Although it may aspire to be the Networks coordinator, or at least play a significant operational role in coordination, in reality, in addition to its current and very significant management issues, it simply does not have the body of scientists on location that can provide the kind of scientific backstopping needed for day-to-day operations and support of the Networks. It is also viewed as primarily a political (policy-making) institution for the DGs of the NARS, which is certainly important, but which makes it appear fairly far removed from the daily, on-the-ground realities of research in the minds of most NARS scientists (not to mention farmers).

The ET does feel, however, that CORAF can and should play an important role, serving as the umbrella structure for the Networks and providing scientific oversight and overall supervision. Specifically, this means:

- Supervising and ensuring the established grant-award process is followed by the Networks—in a sense, verifying and certifying the integrity of the process (this would *not* mean actually reviewing and approving individual project proposals but rather ensuring that the processes and procedures used by the Networks to solicit, review, and judge proposals and to decide on the best and most deserving of grant awards was done with complete integrity, objectivity openness, and fairness).
- Evaluating the management performance of the Network CUs on a regular basis and proposing any necessary changes.
- Helping to sponsor regular and special Network conferences to ensure the broadest possible communication and coordination among the WCA agricultural R&D community.

- Promoting the Networks to donors and to national governments (advocacy, lobbying) and working aggressively to convince governments and their partners of the need and justification for increasing their support of the NARES (which will also strengthen the Networks which connect the NARES).

To support this role, the Team suggests that CORAF consider creating a Network oversight committee composed of five to seven DGs or research directors of NARS in the WCA. Because of its particular mandate, the Team believes that it should be a representative group of DGs and separate from CORAF's scientific and technical committee.

In summary, it is important that these Networks operate under the auspices of a SRO structure like CORAF. But, as one NARS leader said, for CORAF to be involved in day-to-day operations and management of the Networks would “diminish CORAF's importance and the role that it must play.” Indeed, nothing must be allowed to divert CORAF's attention away from its all-important work to improve agricultural research policies and strategies in a unified, coherent manner in WCA and to mobilize the additional long-term funding that is absolutely essential for significant progress to be made in reducing poverty and hunger and increasing food security and incomes.

5. SAFGRAD: SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT

The original SAFGRAD program was established by the Organization of African Unity (OAU) in 1977 and funded in large part by USAID over many years in response to the severe recurring droughts and resulting agricultural crises that plagued the Sahel during the 1970s. It worked hand-in-hand with the NARS as well as with ICRISAT and IITA to test, demonstrate, and disseminate new technologies in farmers' fields and to accelerate technology transfer and adoption. SAFGRAD also helped launch, support, and nurture the Cereal Networks starting in the 1980s. Headquartered in Ouagadougou and led by Dr. Ouattara, former DG of INRAN (Niger) and several other experienced agricultural scientists, SAFGRAD has remarkably survived the many changes in the institutional landscape for agricultural R&D in West Africa.

SAFGRAD recently became the African Union's Specialized Office for the Promotion of Agricultural Research and Development in the Semi-Arid Zones of Africa (AU/SAFGRAD)—“an instrument of integration for food security in Africa.” In January 2004, SAFGRAD became part of the AU's Rural Economy and Agriculture Department. Its new mandate is to “enhance coordination and cooperation in the area of agricultural research, technology transfer, and marketing as well as the management of natural resources in order to improve food security, through promotion of sustainable agriculture and efficient water management techniques both in rural and peri-urban areas of the semi-arid zones of Africa.” These zones, by the way, extend all the way from Mauritania and Senegal eastward to Ethiopia and Somalia and southward down to Zambia and Botswana, and thus includes most of Western and Eastern Africa.

SAFGRAD certainly offers some advantages as a potential Network coordination base, especially in light of its historical connection. Since it is not a research organization and has limited staff (much larger at one time), and since its mandate covers only the semi-arid zones (not

the whole of the WCA subregion), it is not ideally suited for such a role. But it has much to offer, and can certainly play a valuable role in advising and supporting the Networks, and even serving on research committees, special task forces, and policy bodies.

6. ROPPA: RÉSEAU DES ORGANISATIONS PAYSANNES ET DE PRODUCTEURS DE L'AFRIQUE DE L'OUEST (THE WEST AFRICAN NETWORK OF FARMERS ORGANIZATIONS AND AGRICULTURAL PRODUCERS)

ROPPA is a relatively new non-governmental network of farmers' organizations in West Africa (see www.roppa.info). ROPPA was created in 2000 after five years of discussion and reflection, and was legally established in 2001 in Ouagadougou, where it now has a small headquarters office and a limited staff. The coordinator of its Technical Unit is Dr. Magha, a former cowpea breeder from Niger who also served as the scientific director of the NARS in Niger (INRAN) before joining ROPPA in early 2003. Its President is Mr. Niaga Fall from Senegal. The GA is now 70 strong and the executive committee consists of 14 (4 are women leaders). ROPPA consists, connects, and builds on the existing strengths and values of national farmer organizations in 10 West African countries: Benin, Burkina-Faso, Cote d'Ivoire, Guinea, Guinea-Bissau, Gambia, Mali, Niger, and Senegal.

The aim of ROPPA is to represent and defend the interests of farmers and farmer groups, whether it be for better markets, improved access to inputs, or trade negotiations with the World Trade Organization (Doha Round) or within the region. It organized a major seminar in Dakar during May 2003 with representatives from more than 30 countries specifically aimed at speaking with a common voice to the World Trade Organization about the needs of African farmers and the positions of African farmers ("Declaration of Dakar"). They are pushing hard to make sure that farmers are listened to by research scientists. This is certainly an organization that, with dynamic and forceful leadership, will have an increasingly important role to play in ensuring that farmers and farmer groups have a place at the table when policies are debated and formulated, research agendas are defined, and the myriad of other decisions and regulations are made which affect the lives and livelihoods of farm families (unlike in the past when they had very little input).

The Team believes that ROPPA does not yet have the administrative or scientific experience or capacity to effectively and successfully play a coordination role for the Cereals Networks. However, we highly recommend that the Networks seek ways to include ROPPA and its member associations in the various countries and pro-actively find ways to integrate them into Network projects and activities. This could be an important vehicle for ensuring greater input and feedback from WCA farmers in Network programs. Down the road and in the future, it may very well be that ROPPA would be positioned and could assume a much more important role given their representation of farm families and farmer organizations. Even though it is not a research organization, some of its staff are experienced researchers, and since in the future technology transfer and technology dissemination and adoption will be much more central to the lives of the Networks, ROPPA will have some obvious skills and connections to offer.

APPENDIX K: MAJOR FINDINGS AND RECOMMENDATIONS

■ **FINDING 1. The history of the agricultural research Networks in WCA shows a strong record of major, sustained investment and support by USAID that is widely recognized and appreciated within the region.**

The launching of the maize and sorghum Networks in the late 1980s, and then ROCAFREMI and the WARDA task forces (precursor to ROCARIZ) in 1991, and their continued funding represent perhaps the single most significant example of sustained donor investment in agricultural development within the subregion since independence. It is certainly noteworthy that USAID has been the major contributor of funds to this remarkable effort.

Agricultural development is a process of continual change, building on the efforts of those who came before. In this regard the current activities of the four cereal Networks (and this evaluation) are no different. Over the past 40 years USAID has played a sustained and in many ways leading role in assisting the development of food crop research in Africa as a whole, and West Africa in particular. As the Team traveled across the region, visiting many of the national program's central and satellite research stations, it was continually struck by the evidence of both the breadth and depth of this investment. Yet the remaining buildings, equipment and trained scientists tell only a portion of the story of this legacy.

The first major program of USAID's investment in regional agricultural research began in 1964.² Known as JP 26, the Joint Project between USAID and the Organization of African Unity's (OAU) Scientific, Technical and Research Commission was based in Nigeria where it provided assistance to regional research efforts in maize, millet, and sorghum. By its completion in 1976, this project was clearly a success. In 1977, the OAU responded to the worsening African droughts by creating the SAFGRAD program designed to help address the major agriculture problems in the semi-arid areas of the 26 SAFGRAD-member countries. USAID contributed by launching JP 31, SAFGRAD I (1977–1987), to help coordinate and support the accelerated development of productive and sustainable research systems focusing on sorghum maize, millet, cowpeas, and groundnuts. This effort was followed in 1987 by the SAFGRAD II project (1987–1991), which targeted increasing the effectiveness and efficiency of research on sorghum, millet, maize, and cowpea through the linking of IARC and NARS programs in regional collaborative research networks.

Individual project investments made in the 1980s and afterwards were part of a larger strategic framework of African agricultural development. In 1980, the U.S. was designated by the Cooperation for Development of Africa (CDA) group of bilateral donors to take the lead in de-

² The information presented here is drawn from the 1991 Final Evaluation of the SAFGRAD program (Bingen et al., 1991), the 1993 Final Evaluation of the SAARFA (Strengthening African Agricultural Research and Faculties of Agriculture) project (Holdcroft et al., 1993), the 1994 Impact Assessment of the SAFGRAD Commodity Networks (Sanders et al., 1994), the 1994 Midterm Evaluation of the PARTS (Policy, Analysis, Research and Technical Support) project (Edwards et al., 1994), the 1996 Evaluation of the Regional Research Networks for Rice, Sorghum, Maize and Cowpea (Mullenax et al., 1996), and additional sources (Oehmke and Crawford, 1993; Christensen, 1994; Kane and Eicher, 2004). The Team is indebted to Gary Alex, R. James Bingen, and Carl Eicher for their assistance in locating copies of these materials.

veloping an approach to strengthen agricultural research in Africa. The resulting architecture, targeting food crops research, upgrading and reorienting NARS, and conducting on-farm research for small-scale producers, identified five major agro-climatic zones. A CDA donor was to take the lead in each of these zones, with the U.S. taking the lead in Southern Africa and, together with France, also in the Sahel. When the CDA initiative ended in 1986, the U.S. joined the Special Program for African Agricultural Research led by the World Bank. Bridging this period, from 1982 to 1993, the Strengthening African Agricultural Research and Faculties of Agriculture (SAAFRA) project served as the umbrella under which a great deal of USAID assistance to West African NARS was provided.

For a period after termination of USAID's support to SAFGRAD at the end of 1991, the Networks continued to receive support for another decade under the Policy, Analysis, Research and Technical Support (PARTS) project. Through PARTS, funds were transferred to the Networks by making annual amendments to the CGIAR grant agreement with funds earmarked for the different Networks. This approach to financing the Networks continued until responsibility for supporting the Networks was transferred to WARP in 2003. The transfer of oversight responsibility for the Networks to as close to the field as possible is an idea that had been repeatedly proposed since the early 1990s. Currently, WARP is assessing the potential of supporting the Networks through allocations from IEHA.

Responding to this remarkable record of commitment, the Team encourages WARP to invest in documenting and telling the story of USAID's contributions and many achievements in WCA before it is lost forever from the unwritten annals of development history. From the major investments made during the institution-building phase in the early 1960s, through the growth and development of the CGIAR system, the blossoming and decline of the Farming Systems Research movement, and the myriad of bilateral projects and contributions to multilateral programs before and since, USAID has unquestioningly played an influential and leading role in the effort to induce agricultural change within the subregion.

RECOMMENDATION 1. WARP and its key partners should carefully review the remarkable history and achievements of agricultural research Networks in WCA, with a view to making their decisions regarding the future of the Networks within the larger historical context and longer term development goals and vision of the region.

■ **FINDING 2. The Networks have amply demonstrated their importance and value to regional, collaborative agricultural research and development in WCA, making them well positioned to contribute significantly to the IEHA.**

WARP provided the following general definition of Networks:

Networks comprise a group of individuals with a common objective or interest in finding a solution or solutions to a common problem or problems and then ultimately sharing the benefits. Networks are therefore an important platform for individuals in different countries or regions but with a common vision to (a) work collaboratively on such issues or themes as R&D, (b) minimize duplication of efforts, (c) contribute their resources towards the achievement of the objectives, and (d) ultimately share the information and/or outputs of the Networks.

The Team agrees with this statement and believes the four cereal Networks fully meet the objectives outlined. More specifically, on the basis of the Team's analysis, these four Networks are widely recognized as major tools for:

- Mobilizing resources (human and financial) for agricultural research activities on high priority, targeted *regional* issues.
- Human capacity development (training of technicians, professional development of scientists, monitoring tours, regional professional meetings, visiting scientists programs) with a spillover to other areas in the national research agenda and donor-supported efforts.
- Enhanced information flow between scientists within the subregion.
- Access to an extensive, diverse collection of germplasm.
- Improved interaction between different stakeholders in the subregion (monitoring, tours, workshops, and visits to national programs).
- Strengthening of partnerships between IARCs and NARS.

On the basis of these particular Networks, the two most critical or essential functions of the Networks would seem to be (1) the exchange of technologies (germplasm, crop management, even research methodologies) and (2) the sharing of ideas and experiences through personal communication and interaction of scientists. Training, professional development, and capacity building would be a close third. Moreover, the Networks have been a very good mechanism for disbursing research grants, primarily because they foster substantive collaboration and exchanges among scientists across the region, which results in sharing of problems and solutions while minimizing isolation and duplication of effort—a relatively large value for a small donor investment. In short, this is not just an ordinary grants program, but a regional collaborative research effort.

Although the last economic analysis on the impacts of these Networks is becoming increasingly dated, the Team believes based on the evidence reviewed that the Networks continue to make significant contributions to increased production and incomes associated with the four key cereal crops in WCA. The Networks as a whole are perhaps positioned as never before to make a substantial impact on agricultural development in WCA and to be a major force in “rapidly and sustainably increasing agricultural growth and rural incomes in sub-Saharan Africa” (IEHA’s primary objective). Furthermore, one of the most valuable aspects of these Networks is that they comprise a linked-group of some of the best agricultural scientists in the region, with operational readiness to work collaboratively and regionally on development issues.

For USAID—and other development organizations and donors as well—the Networks should be viewed as a substantial asset for other regional and bilateral projects. Finally, there should be a commitment to long-term support to enable the Networks to engage in rationale planning and carry out substantive program development activities.

RECOMMENDATION 2. The current investors (NARS, IARCs, USAID, CORAF) should continue, if not increase, their support for these Networks by making a reasonably long-term funding commitment, subject to the Networks’ continued evolution in response to changing needs of farmers and others in the cereal subsector, increased impact, and periodic review and assessment.

■ **FINDING 3.** It is difficult to fully and accurately assess Network impact on account of insufficient data, and this poses a problem for the Networks as they seek to make the case for increased financial support.

Conducting impact assessments are complex, costly, and time-consuming. Hence they represent a major challenge to the NARS and the Networks, but one they must find a way to overcome in order to persuade their own governments as well as donors to continue to match resources to needs and productivity. Much to their credit, the Networks have funded some impact studies in recent years (e.g., WECAMAN), but these are few and far between. In addition, some data exist already within the NARS, but the Networks need to do a much better job of compiling, analyzing, and presenting this information, and in a systematic ongoing way. This is a task to be accorded much higher priority by the Networks.

RECOMMENDATION 3. The Networks should work together and in conjunction with the NARS to develop systems to collect and analyze the necessary data to better quantify the socioeconomic impact of Network activities at the farm level.

■ **FINDING 4.** The full and active involvement in the research process by farmers (the primary client and targeted end-user) has shown its great value in helping ensure that research specifically addresses and focuses on farmers' needs and constraints (demand-driven, not supply-driven research), thereby resulting in higher rates of adoption of new varieties and other technologies truly suited to the specific circumstances of farmers.

It is encouraging to observe that over the past two decades significant innovations and changes have occurred in the way research is conducted in the WCA, and especially in the participation of the clients themselves. This is evident not just in the myriad of on-farm tests and demonstrations one now sees, but also in breeders' working more closely with farmers in selecting the most appropriate varieties for further development or release. It is vital that the full intellectual power of Network scientists be mobilized to develop and improve not only existing participatory models, but also invent new ones.

On the research side, Participatory Plant Breeding (PPB) and PVS methods have been tried fairly extensively in the region with good success and seem to greatly increase the probability that farmers will be interested in and accept new and so-called improved technologies. The use of farmer-based crop variety improvement through PPB and PVS is recommended to increase farm-level genetic diversity and to better address characteristics for which consumers pay a premium (aroma, color, cooking quality). PPB is one way of tapping into farmers' capacities and knowledge in improving the outcomes of making crosses, selections and seed production.

On the extension side, FFS, introduced in the 1980s in Asia and since the 1990s in Africa, and similar approaches have demonstrated the effectiveness in putting farmers in the center of the learning process, empowering their decision-making abilities over what to do and why, and in the process joining indigenous knowledge with modern scientific knowledge.

RECOMMENDATION 4. The Networks should much more strongly encourage and promote the application and use of farmer-participatory methods in all future Network research programs, with the expectation of spillover of these approaches into national research programs.

■ **FINDING 5. There continues to be a widespread lack of good Internet connectivity throughout much of the WCA, a situation which impedes the ability of Network scientists to communicate with each other and the rest of the agricultural R&D community.**

Given the acceleration of technological advances elsewhere in the world, the digital divide in West Africa is growing rather than shrinking. The majority of scientists do not have regular access to the Internet in their offices or even on the research stations where they are based, and must go into town (sometimes many kilometers away) to local cyber cafes in order to communicate with colleagues. For scientists at remotely located research substations, however, this is generally not possible. In most cases, connections are not reliable, as they depend on landlines with speeds that vary from slow to extremely slow, and some days are nonfunctional. This seriously restricts the ability of scientists to exchange e-mails, receive and send electronic documents, and conduct Web searches.

For the most part, the digital problem is not the lack of computers, as was the case a decade or so ago. Most scientists have been able to procure computer systems using various sources of funding. Current difficulties revolve around the lack of Internet connectivity, for which there is no such obvious solution. Since the Networks are first and foremost vehicles for exchanging and sharing information among colleagues with common interests across the WCA, such a poor communication system is a major obstacle and impediment. Enhancing the ease and frequency of communications among Network scientist and their partners must be a high priority.

RECOMMENDATION 5. USAID, CORAF, FARA, and others interested partners should undertake, with a sense of urgency, a study on the technical and economic feasibility of establishing and maintaining satellite linkages for key research stations and groups throughout the region.

■ **FINDING 6. African universities seem largely uninvolved in Network programs, which is a lost opportunity for both and a detriment to WCA farmers.**

African universities, especially faculties of agriculture, were conspicuously and nearly totally absent from the Team's visits and meetings throughout the region. In its request to the country (national) Network coordinators for assistance in designing the program of visits, the Team did not specifically request that universities be included in the itinerary. The only university that the Team visited during the course of its six weeks of travels in the subregion was Ahmadu Bello University (ABU) in Zaria, northern Nigeria. Members of two Networks (WECAMAN and ROCARS) are based at ABU because their own national R&D organizations (NAERLS and IAR) form an integral part of ABU's structure (a legacy of the land-grant model promoted by USAID during the institution-building phase of its development funding).

Note that WECAMAN has developed good collaboration over the years with universities in the WCA, especially in Nigeria and Ghana. In the case of ROCARIZ, specific efforts have been undertaken to involve university-based researchers largely as a result of the WARDA director general's concern for bridging this divide within the research community (e.g., ISNAR/WARDA, 2001). But for the most part, linkages between the Networks and universities in WCA have not been strong.

In recognition of this problem—or missed opportunity—CORAF has decided to commission a study in the near future on the role of universities in agricultural R&D in the subregion and the reason for the lack of integration with the NARES. Hopefully, this study will identify some meaningful, long-term solutions. In the meantime, the Networks certainly have the flexibility to attract, invite, and bring in selected university faculty members with relevant experience and demonstrated interest in order to strengthen existing Network teams. Appointing an experienced, highly regarded university faculty member, with strong scientific expertise in appropriate domains, into an important position (e.g., steering committee or research committee) might be a good first step. The Network grant mechanism could also be used to support the inclusion of university faculty members in multidisciplinary teams that receive funding from the Networks. Their inclusion should be of special benefit to the Networks as they move more and more toward technology transfer-type activities where Networks will need to play the role of facilitator, catalyst, and scientific backstopping in a give-and-take style teaching–learning environment and community.

RECOMMENDATION 6. The Networks should make specific plans to establish linkages with training and research programs in the African university community.

■ **FINDING 7. Despite the valued services and functions provided by the Networks, their accomplishments and apparent impact to date, and their demonstrated cost effectiveness, national governments in the region have not yet summoned the political will, nor found the necessary means internally, to begin funding Network research on their own.**

According to recent NEPAD documents (CAADP, 2003), public spending for agricultural research has not increased over the past 25 years for Africa as a whole. The underfunding of the NARS greatly constrains what the Networks are able to achieve and must change.

Even if the smaller countries could eventually allocate \$5-10,000/year/Network and the larger nations could budget \$15-20,000/year/Network, this would be an important long-term investment. Currently, the investment of most WCA countries in agricultural research covers staff salaries, vehicles, infrastructure, and the like, but little if any for the operating costs of research (the actual extra expenses necessary for conducting a trial or project). Direct national (financial) contributions to the Networks would send a long-awaited signal to their own scientists, as well as to donors, of the importance they attach and their commitment to agricultural R&D.

RECOMMENDATION 7. The NARS, individually and collectively (through CORAF), should find new and persuasive ways, through the influence of their combined strength and within the auspices of NEPAD, to appeal to national governments to change their policies related to funding of national research and, as a start, to cover the costs of some of the Networks' research programs.

■ **FINDING 8. R&D progress made by the Networks to date, together with changing conditions in the region as well as the evolving needs of farmers and others in the cereal subsector, require new strategic directions,, programs, and partners.**

The Team believes that, despite the many accomplishments and benefits of the Networks, as well as their adaptiveness in responding to new challenges, it is now time for the Networks to again assess their priorities and define more proactive steps to addressing key issues. In general, less emphasis should be placed on funding basic research—in particular, plant breeding and varietal development—and more emphasis placed on adaptive research and technology transfer—a direction most of have already begun to take. (Do not forget that the selective funding of research is sometimes an important means of achieving other objectives; for example, training scientists in the use of participatory approaches only produces benefits if such skills are actually used, which can be facilitated by appropriate research grants.) Such a shift in emphasis would direct more support and resources to farm-level and farmer-centered testing, establishing necessary linkages with technology diffusion organizations, and promoting the spread and use of new research methodologies.

The Team believes that the priority development areas on which the Networks should now concentrate are as follows:

- Exchange of germplasm.
- Community or farmer-based seed systems (CBSS).
- Enhanced productivity of the growing environment.
- Harvesting, post-harvest handling, and storage practices.
- Crop processing, utilization, added value, and new product development and testing.

Greatly increased attention to supportive, farmer-oriented policies and institutions is also critical (e.g., credit, inputs, market information), but the Team would not encourage the Networks to take leadership in these areas (though they must find ways to be usefully involved) since CORAF has just launched a new agricultural policy network (REPA) and WARP is funding a subregional market information system to create an “enabling” environment.

RECOMMENDATION 8. The Networks should carefully review the balance between funding research and technology transfer in their programming as well as the creation of internal synergies between activities to maximize opportunities for vigorously moving promising technologies into the hands and fields of farmers.

■ **FINDING 9. New areas of emphasis of the Networks would benefit greatly from additional specialized expertise to ensure rapid initial progress and near-term results.**

As indicated above and described in greater detail in section 4.2, areas where the Networks have provided key services in the past and where they could do much more in the future, include the following:

- **Genetic Material Exchange:** The ability to have regular, effective, and highly accessible means of transferring genetic material among researchers within the subregion is critical. The Networks have been highly successful in filling this role, and this should be continued.

In the case of millet and sorghum, and to a lesser extent rice, crops for which West Africa is a center of genetic origin and diversity, and where imported material has had limited impact (especially true for millet and sorghum), the ability to exchange and test improved as well as indigenous material in new locations takes on an even greater importance.

- **Seed System Support:** The ability to locally select and diffuse new genetic material is a major challenge, and one that the Networks have begun to address, but in an indirect manner. National research programs, and individual breeders, who are supporting most of the seed diffusion activities, have limited capacity to generate broad-based impact. In addition, most extension programs have been excluded from the process, and even if involved, do not have appropriate operational models to be effective in facilitating a largely farmer-based seed multiplication and diffusion effort. Virtually all the IARCs have begun to promote and use variants of the PVS and CBSS.
- **Processing and Product Development:** The ability to develop new products and create greater market pull for bulk grain production will likely define the future challenges of increasing cereal production, especially for millet and sorghum. For most of these crops, the development of new processed products and industrial uses within the subregion will likely be a key in defining future markets and (thus) demand as well as price levels for additional production. Both sorghum and maize have potential in growing animal feed markets and the brewing industry.
- **Enhancement of the Crop Growing Environment:** The great need today is to consolidate and disseminate best practice information regarding the enhancement of crop-growing environments for cereal production in all ecologies found across the subregion. This would include a mix of indigenous and research-generated management practices, many of which focus on improving soil fertility, particularly nitrogen and phosphorous, which are almost universally deficient and hence a major constraint to higher yields in the cereal growing areas of the WCA.

An approach to both preserving the independence of Networking priority setting and functioning, while at the same time enabling USAID to achieve a much higher degree of development impact in the key thematic areas outlined above, would be to support *additional* technology transfer efforts in the following three key areas:

1. Seed system development
2. Post-harvest processing and enhanced value-added crop utilization
3. Development of adult learning modules focusing on improving the cereal production environment.

The Team believes that these are areas where WARP's contribution would make great sense, especially in terms of contributing directly to achieving the objectives of the IEHA. More detailed suggestions are provided in section 4.2. This would probably require discrete funding as part of a larger focus on these critical development issues, but they are excellent examples of the kind of cross-cutting issues that the Networks can work on collaboratively. The Team does not

believe additional technical support is necessary for the exchange of genetic materials, as this is a long-established and successful Network activity.

RECOMMENDATION 9. USAID in conjunction with other donors should consider funding, for a limited period of three to five years, three internationally recruited scientist positions to provide regionally oriented, Network-connected support in the areas of seed systems, post-harvest processing, and improved production environments.

■ **FINDING 10. As the Networks assess and embark on new strategic directions, this provides an excellent opportunity for thinking creatively about program emphases, new partnerships, and potential cross-network activities.**

These Networks have, to varying degrees, been all evolving toward more development-oriented and technology transfer projects. As stated earlier, they should be encouraged to move even more purposefully in that direction, with the important caution of not getting overly involved in front-line technology diffusion efforts. For some time, they have not been simply or exclusively focused on research as their names imply.

In addition, these Networks have over the years worked more and more on the cropping systems in which each cereal plays a central role. As a result, they are now “cereal-based systems” (e.g., millet-based) agricultural R&D Networks rather than just cereals. Many organizations find it useful, often energizing and rejuvenating, to revisit and update their vision, mission, and strategic goals. It is especially important for organizations like these Networks, which are so diverse and dispersed, to clarify and solidify their mission periodically to make sure all the members share, can articulate, and firmly believe in a common view and purpose.

Collaborating with other Networks, even non-cereal ones, offers a number of advantages. Obvious examples of common, cross-network challenges include those of finding ways to make improved varieties locally available, developing needed processing equipment, and conducting joint research on the use of intercropping to enhance soil productivity and farmers incomes.

The most common and important crops grown in rotation or association with these cereals, based on long tradition, are edible grain legumes—and for very sound reasons (among them, soil fertility and human nutrition). More and more R&D is being conducted by Network scientists on increasing and enhancing the role of legumes in the cereal-based systems. Cowpeas are the most common and widespread of these legumes; they are found with all the cereals of the four Networks, but especially with millet and sorghum. The list also includes groundnuts, a food plus cash crop that plays a vital role in the Sahel; soybeans, a relative newcomer that has shown its adaptability to African conditions and whose planted area continues to grow; and Bambara groundnuts, an indigenous species of minor importance at present in the WCA compared to the others, but which provides another good N-fixing and high-protein option for farm families.

Networks for cowpeas exist already (e.g., PRONAF and the Cowpea/Bean CRSP) as well as for groundnuts. Since cereals and legumes are so mutually beneficial, and together form the mainstays of the WCA food crop systems, it seems only logical, especially from both farmer and

agronomic perspectives, that cereal Network scientists seek to merge some of their activities with their legume counterparts, and vice versa.

From the internal documents reviewed, the combined networking of cereal and legumes seems to have worked quite well in Asia, as exemplified by the case of the Cereals and Legumes Asia Networks (CLAN). Formally launched in 1992, CLAN was the result of the fusion of two networks, already fairly broad-based: the Cooperative Cereals Research Network and the Asian Grain Legumes Network. CLAN supports, facilitates, and coordinates research collaboration and technology exchange for seven core crops (millet, sorghum, groundnuts, chickpeas, pigeon peas, lentil, and mungbean) among scientists in more than a dozen countries. Although the CLAN does not fund collaborative research, and thus its need for strategic planning is much reduced, this example does highlight the potential of increased cross-network activities involving cereal and legume crops.

Overall, the Team believes that cross-network cooperation, between the cereal Networks and those of other crops, represents the most promising area of future networking activity and must be improved.

RECOMMENDATION 10. In their next phase of development, the Networks should begin to consider a larger vision and build areas of programmatic cross-network activity.

■ **FINDING 11.** Many serious and thoughtful ideas have been expressed by USAID and the key Network partners about the best way to move forward in reconfiguring or combining (or not) the existing Networks and in considering where to locate the Network Coordination Units.

The Team's analysis of the various and often controversial views and perspectives have been laid out in section 4.2. As might be expected, there is no simple answer, and no magic formula has emerged. In fact, a number of different solutions may work fine, given the necessary political will and positive support (*bonne volonté*) by Network members and others involved in the process. A mechanism for reaching a consensus decision that most, if not all, could learn to live with is summarized in section 6.0. Any changes made should be introduced in a progressive, phased, step-by-step fashion to avoid unnecessarily large or abrupt modifications with too many complexities.

RECOMMENDATION 11. The leadership of the Networks (ROCARS, ROCAFREMI, ROCARIZ, and WECAMAN), working in conjunction with CORAF and WARP, should design and facilitate a process, based on consensus and compromise, for arriving at a set of changes to the Networks' configuration and coordination base.

A starting point for the process proposed in Recommendation 11 would be a partners' meeting to discuss and agree on Network objectives, the roles and responsibilities of all stakeholders, and specific steps for jointly moving in the directions that are determined. A plan for this meeting is laid out in Section 6.0. The outcomes of this consultative process would define the next phase of Network operation and would be implemented progressively over an appropriate period. As one set of inputs into this discussion, the Team offers the following sug-

gestions and observations that the Networks might consider, together with their key partners (WARP, CORAF, IARCs), as they define their future path.

SPECIFIC RECOMMENDATIONS ON NETWORK ORGANIZATIONAL ISSUES

- CORAF and the appropriate Network coordinators should be strongly encouraged to facilitate the completion of the merger of ROCARS and ROCAFREMI into a single Network.
- CORAF and the appropriate Network coordinators should be strongly encouraged to facilitate the immediate merger of the CORAF Maize Network with WECAMAN.
- The similar merger of the WARDA task forces and CORAF Rice Network should be examined as a template.
- The Networks should seriously consider other structural changes to the Networks. The Team's analysis suggests that, for the time being, maintenance of three Networks (sorghum-millet, maize, and rice) is optimal, but other models are of course possible and should be discussed.
- In conjunction with discussions on Network structure, thorough consideration should also be given to optimal ways of building cross-network linkages, both between the existing cereal Networks as well as with other Networks and initiatives (e.g., INTSORMIL and Bean/Cowpea CRSPs). WARP in particular should view these core areas of cross-network collaboration as themes where additional resources could be strategically invested with the expectation of high returns. The Team has identified new product and processing development, local seed system development, and learning module development for crop environment management as three such themes, with the further suggestion that dedicated internationally recruited scientist leadership positions be created as the most expedient way making progress in these areas.
- The management structures of each of the Networks should be examined for lessons learned and best practices that might be adopted by the other Networks (e.g., the reporting of NARS matching funds on all ROCARIZ Network research grant proposals, WECAMAN's use of an external review panel to award research grants, and ROCAFREMI's use of lead NARS as a means of decentralizing and advancing development of key research themes).
- Following the example set by ROCARIZ, the other Networks should consider selecting a strong NARS scientist to serve as Network coordinator; consideration should also be given to the terms of appointment (e.g., two-year initial appointment, with a possible one-time three-year extension).
- Guided by criteria of necessary service provision and backstopping, the Networks and their partners should decide on and/or reaffirm the best location for the coordination of each Network. The Team's analysis suggests that the coordination of ROCARIZ and WECAMAN would probably be best maintained for the time being at their current locations (WARDA and IITA, respectively); whereas the joint ROCARS-ROCAFREMI Network might now be best based at an appropriate NARS, or a joint NARS-IARC coordination model such as currently employed by ROCARS (with the Mali NARS) might be considered.
- In addition to deciding on an optimal organizational plan, attention should also be given to elaborating the most appropriate implementation pathway in terms of phasing, additional

resources that may be required, and the process by which any additional changes might be reviewed and acted on.

- Opportunities should be closely examined for transferring certain Network functions, such as seed multiplication, from the coordination unit to a willing and qualified NARS.
- Each of the Networks, as in the case of ROCARIZ, should consider the introduction of appropriate requirements for NARS matching funds (excluding staff salaries, facilities, and items already provided) on all research grants.
- The Networks should circulate widely the details of the annual Network budgets through the NARS DGs and the national Network coordinators in each country, so that the NARS scientific community is well informed of the level and flow of Network funds (it is imperative to avoid the misunderstandings and misperceptions concerning the budget that exist now and undermine the confidence and sense of solidarity between the IARCs and the NARS).
- Consideration should be given to ways of building more constructive ties between the Networks and CORAF. The Team identified the possibility of creating a Network oversight committee, composed of members of the CORAF general assembly, to review strategic plans and annual work plans and to undertake performance reviews.
- In support of the process of Network renewal, WARP should initiate discussions with each of the CGIAR centers over their commitment to working through the Networks and the possibility of further reducing the overhead charges as additional cost share in support of the Networks. Such a decision would send a very strong signal to the NARS and to the donors of the IARCs commitment to the Networks and the value and benefits the IARCs derive from their participation in the Networks.
- WARP, CORAF, and the IARCs should provide leadership in helping to attract other potential donors in support of the Networks; the invitation of key donor representatives to the stakeholder's planning meeting should be considered.